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Impact of Universal Social Coverage on Life Expectancy: An Econometric Analysis Using an ARDL Model

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Abstract This study investigates the long-run relationship between Universal Health Coverage (UHC) and life expectancy in Morocco using annual time series data from 1990 to 2023. We employ the Autoregressive Distributed Lag (ARDL) bounds testing approach to examine cointegration among life expectancy, UHC, urbanization, and hospital admissions. The optimal model specification, selected via Schwarz Information Criterion, demonstrates strong evidence of cointegration. Long-run estimates reveal that UHC exerts a statistically significant positive effect on life expectancy, indicating that coverage expansion is associated with meaningful improvements in population health outcomes. Urbanization emerges as a quantitatively large predictor, reflecting its role as a composite proxy for multiple co-evolving developmental factors. These findings provide empirical support for Morocco's recent UHC reforms while highlighting that coverage expansion operates within broader developmental contexts. Appropriate caution is warranted in interpreting individual coefficient magnitudes given the inherent correlations among developmental indicators in Morocco's socioeconomic transformation.

Keywords Universal Health Coverage; Life Expectancy; ARDL Model; Cointegration; Morocco; Health Economics; Time Series Analysis

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1. Introduction

The determinants of population health constitute a fundamental inquiry in health economics and public policy. Life expectancy, serving as a comprehensive indicator of population well-being, reflects the cumulative impact of medical technology, healthcare accessibility, socioeconomic conditions, and public health infrastructure [1, 2]. While global life expectancy has increased substantially over the past century, rising from approximately 30 years in 1900 to over 73 years today, pronounced disparities persist both between and within nations, with low- and middle-income countries confronting challenges in translating economic development into sustained health improvements [3, 4].

Universal Health Coverage (UHC) has emerged as a central objective in contemporary health policy, formally enshrined in the United Nations Sustainable Development Goals (SDG 3.8) [5]. The World Health Organization conceptualizes UHC as ensuring that all individuals can access essential health services without experiencing financial hardship [6]. Theoretical frameworks posit that UHC operates through multiple transmission mechanisms: removing financial barriers to care utilization, enabling earlier disease detection through preventive services, improving medication adherence through reduced out-of-pocket costs, and mitigating catastrophic health expenditures that can impoverish households [7, 8, 9, 10].

Morocco presents a particularly instructive case for examining UHC's impact on population health outcomes. Following decades of fragmented health coverage characterized by substantial out-of-pocket payments and limited

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insurance penetration, Morocco initiated comprehensive health system reform [11]. The government introduced the Medical Assistance Regime (RAMED) in 2012 targeting vulnerable populations, complementing existing schemes covering formal sector workers. Most significantly, His Majesty King Mohammed VI launched a nationwide initiative for universal health coverage and social protection in April 2021, representing a transformative shift in national health policy. By December 2022, RAMED beneficiaries transitioned to the AMO-Tadamon scheme, and as of October 2024, coverage reached 86.48% of the population, approximately 31.8 million individuals [12]. This rapid expansion provides valuable quasi-experimental variation for evaluating UHC's causal effects on health outcomes.

Despite extensive theoretical rationale and policy emphasis on UHC, empirical evidence regarding its causal impact on health outcomes remains mixed and context dependent. Cross-national comparative studies document positive associations between insurance coverage expansion and population health improvements [13, 14], yet establishing causal attribution presents substantial methodological challenges. Confounding factors including economic development, educational attainment, and healthcare infrastructure investments often correlate simultaneously with both UHC implementation and health improvements, complicating inference. Moreover, UHC's effectiveness depends critically on implementation quality, including provider network adequacy, service delivery mechanisms, and actual utilization patterns–rather than nominal coverage rates alone [15].

This study addresses these empirical gaps by examining Morocco's experience over three decades (1990-2023), encompassing pre-reform periods, gradual coverage expansion, and recent universal coverage implementation. We employ the Autoregressive Distributed Lag (ARDL) bounds testing methodology developed by Pesaran et al. [16], which offers distinct advantages for analyzing time series data with potentially mixed orders of integration and limited sample sizes. The ARDL framework enables simultaneous estimation of both short-term dynamics and long-term equilibrium relationships while accommodating potential endogeneity through distributed lag structures. This approach proves particularly appropriate for Morocco's context, where policy implementation occurred gradually rather than as a discrete intervention, necessitating methods that capture dynamic adjustment processes. Similar dynamic perspectives underpin epidemiological models used to evaluate health policy interventions and optimal control strategies [17, 18, 19].

Our analysis contributes to existing literature along several dimensions. First, we provide among the first rigorous time series analyses of UHC's impact in a North African context, extending the predominantly cross-sectional evidence base. Second, we explicitly model the cointegrating relationship between UHC and life expectancy, establishing whether observed associations represent genuine long-run equilibria or spurious correlations arising from common trends. Third, we incorporate key socioeconomic covariates, urbanization and healthcare utilization, enabling isolation of UHC's independent effect while accounting for potentially confounding developmental trends. Fourth, we implement comprehensive diagnostic testing addressing critical methodological concerns including multicollinearity, structural stability, and model specification. Fifth, we provide transparent discussion of analytical limitations and remaining threats to causal inference, offering a balanced assessment of UHC's measured impacts.

2. Literature Review

The analytical foundation for examining health insurance impacts derives from Grossman's seminal health capital model [20], which conceptualizes individuals as producers of their own health stock that depreciates over time and can be invested in through medical care, nutrition, education, and lifestyle choices. Health insurance operates by reducing the effective price of medical care inputs, inducing greater healthcare utilization and potentially improving outcomes [21, 22]. Subsequent refinements identify multiple transmission mechanisms: insurance encourages earlier treatment when interventions prove most effective [23], prevents health shocks from depleting household resources [24, 25], and enables more efficient healthcare financing through risk pooling [26]. However, moral hazard considerations suggest insurance may induce excessive utilization of low-value services [27, 28].

Empirical evidence on health insurance effects employs diverse methodological approaches with varying success in establishing causality. Randomized controlled trials provide the strongest evidence: the RAND Health Insurance Experiment found cost-sharing reduced utilization but showed limited health effects except among high-risk populations where free care improved blood pressure control and reduced mortality risk [29, 30]. The Oregon Health Insurance Experiment documented that Medicaid expansion increased healthcare utilization and reduced financial strain, though it showed no statistically significant effects on measured physical health outcomes over a two-year follow-up period, potentially due to limited statistical power and insufficient time for mortality effects to manifest [31, 32]. These experimental findings suggest health insurance effects may be heterogeneous across population subgroups and require extended observation periods to detect mortality impacts.

Quasi-experimental studies exploiting policy discontinuities generate more consistent evidence of insurance effects on health outcomes. Card et al. [33] employed a regression discontinuity design around Medicare eligibility age in the United States, documenting that insurance acquisition at age 65 reduced mortality among previously uninsured individuals by approximately 20%. Similarly, Sommers et al. [34] analyzed state-level Medicaid expansions, finding mortality reductions of approximately 19.6 deaths per 100,000 adults aged 20-64 years in expansion states relative to non-expansion states. Black et al. [35] examined Medicare's introduction in 1965, documenting substantial mortality reductions among elderly Americans, particularly for conditions amenable to medical treatment. However, these estimates exhibit substantial heterogeneity across contexts, suggesting that insurance effectiveness depends critically on baseline health system capacity, population health status, and the specific services covered under insurance schemes.

Cross-national comparative studies have consistently documented positive associations between health coverage expansion and population health improvements, though causal interpretation remains contested due to confounding factors. Moreno-Serra and Smith [13] analyzed panel data from 153 countries over 1995-2008, finding that movement toward universal coverage associated with improved health outcomes, including reduced infant and under-five mortality rates. The magnitude of estimated effects varied substantially across income groups, with middle-income countries exhibiting larger gains than either low- or high-income nations, potentially reflecting optimal conditions for coverage expansion where baseline infrastructure exists but coverage gaps remain substantial. Stuckler et al. [14] examined health system financing reforms in 25 European countries, documenting that universal coverage schemes providing comprehensive benefits demonstrated superior health outcomes compared to systems relying on user fees or voluntary insurance. These cross-national patterns provide suggestive evidence of UHC benefits, though attribution challenges remain given simultaneous improvements in infrastructure, education, and economic development.

UHC implementation experiences in low- and middle-income countries provide valuable insights for resource-constrained settings pursuing coverage expansion. Thailand's achievement of near-universal coverage through its Universal Coverage Scheme, introduced in 2001, has been extensively studied and demonstrates measurable health impacts. Gruber et al. [36] documented that the reform reduced out-of-pocket health expenditures by 11% and infant mortality by 5.7% within five years of implementation. Limwattananon et al. [37] found evidence of improved financial protection, with catastrophic health expenditure incidence declining from 6.1% to 2.8% among the poorest quintile. However, concerns regarding healthcare quality deterioration and provider shortages emerged during rapid expansion, highlighting implementation challenges beyond nominal coverage extension [38].

Rwanda's community-based health insurance (Mutuelles de Santé), achieving over 90% coverage by 2012, provides another instructive case of UHC implementation in a low-income setting. Lu et al. [39] found that insurance enrollment associated with 23% lower under-five mortality and 47% reduction in probability of reporting serious illness without seeking care, suggesting improved healthcare access translated into measurable health gains. Makaka et al. [40] documented significant improvements in maternal and child health indicators following coverage expansion. China's New Rural Cooperative Medical Scheme, enrolling over 800 million rural residents by 2010, represents the world's largest health insurance expansion. Yip et al. [41] documented modest improvements in healthcare utilization and financial protection, though effects on health outcomes remained less clear initially due to limited benefit coverage. Lei and Lin [42] found evidence of reduced mortality among elderly rural residents, suggesting health impacts emerged as benefit packages expanded over time. These international experiences demonstrate UHC's potential to improve population health outcomes while highlighting critical importance of implementation quality, benefit design adequacy, and complementary health system investments.

It is important to note, however, that the empirical literature does not universally support positive effects of insurance expansion on health outcomes. The Oregon Health Insurance Experiment found no statistically significant improvements in measured physical health outcomes over two years of Medicaid coverage [31, 32], illustrating that insurance effects may require longer observation windows or stronger benefit packages to materialize. Wagstaff and Lindelow [24] documented in China that insurance expansion paradoxically increased financial risk exposure among certain households, highlighting that coverage without adequate provider capacity can generate perverse outcomes. In contexts where supply-side constraints are binding, insufficient facilities, provider shortages, or weak referral systems, extending nominal insurance coverage may yield limited or no measurable health gains. These null and mixed findings underscore that Morocco's positive results should be interpreted within its specific institutional and developmental context, and that the design and implementation quality of coverage schemes matter as much as their breadth.

Time series econometric methods offer particular advantages for evaluating health policies implemented gradually across extended periods rather than as discrete interventions. The ARDL bounds testing methodology [16] has gained prominence in health economics for its capacity to accommodate mixed orders of integration, critical when examining variables like life expectancy (typically integrated of order one) alongside policy indicators that may be stationary or non-stationary. This approach provides formal cointegration tests without requiring pre-testing for unit roots, addressing a key limitation of traditional Johansen or Engle-Granger methodologies that assume known integration orders. Arthur and Oaikhenan [43] examined health expenditure effects on life expectancy across West African countries using ARDL methods, finding significant long-run relationships in most nations but with substantial cross-country heterogeneity in effect magnitudes. Piabuo and Tieguhong [44] analyzed health expenditure and economic growth relationships in Central African countries, documenting bidirectional causality in some countries but unidirectional effects in others. Rana et al. [45] employed ARDL to examine determinants of life expectancy in South Asian countries, finding that healthcare expenditure, sanitation access, and education all contributed significantly to longevity gains. However, relatively few studies have applied these techniques specifically to evaluating UHC programs in North African middle-income countries, representing a gap this research addresses by providing rigorous time series evidence on Morocco's UHC expansion and its relationship with population health outcomes.

3. Methodology

Following the health production function framework, we posit that life expectancy is determined by health system factors, socioeconomic development, and healthcare utilization. The baseline theoretical relationship can be expressed as:

$$\mathrm{LE}_t = f(\mathrm{UHC}_t, \mathrm{URB}_t, \mathrm{ADM}_t, \varepsilon_t)$$

where LE represents life expectancy at birth, UHC denotes universal health coverage (measured as proportion 0-1), URB captures urbanization rate, ADM represents hospital admissions, and ε encompasses unobserved factors influencing health outcomes. To enable elasticity interpretation and stabilize variance, we apply logarithmic transformations to continuous variables while retaining UHC in levels, yielding the estimable specification:

$$\ln(\mathrm{LE}_t) = \beta_0 + \beta_1 \mathrm{UHC}_t + \beta_2 \ln(\mathrm{URB}_t) + \beta_3 \ln(\mathrm{ADM}_t) + \varepsilon_t$$

We retain UHC in levels rather than logarithmic form based on both empirical considerations (bounded proportions between 0-1 introduce interpretation complexities when logged) and substantive grounds (semi-elasticity interpretation aligns with policy discourse on percentage-point coverage changes). An important specification decision concerns education exclusion from the final model. Preliminary estimation revealed secondary enrollment statistically insignificant (coefficient = -0.018, p = 0.354) with theoretically inconsistent negative sign, almost certainly a consequence of severe multicollinearity with urbanization, given the strong empirical correlation between educational attainment and urban residence in Morocco's development trajectory. We acknowledge that excluding education, a theoretically core determinant of health in the Grossman framework [20], risks omitted variable bias if education exerts an independent effect on life expectancy not fully captured by our included regressors. Our substantive defense is that urbanization in this context serves as a de facto composite proxy for multiple co-evolving developmental dimensions, including educational attainment, sanitation, income, and infrastructure access, which is consistent with its large estimated coefficient. The very high urbanization VIF (80,567) further confirms that it absorbs variation that would otherwise be attributed to education and other excluded developmental variables. This interpretation implies that the urbanization coefficient should be understood broadly as capturing an integrated developmental effect rather than a narrow ”urban residence” effect, and that the omitted variable bias from excluding education is partially mitigated by this absorption. Nevertheless, this remains a limitation, and future analyses with richer data or orthogonalized development indices would enable more precise identification of education’s independent contribution.

The ARDL approach developed by Pesaran et al. [16] offers distinct methodological advantages for our application. Unlike traditional cointegration methods, ARDL accommodates mixed integration orders without requiring pre-testing, performs well in small samples, and simultaneously estimates short-run dynamics and long-run equilibrium relationships through a single reduced-form equation. The general ARDL(p, q_1, q_2, q_3) model specification takes the form:

$$\begin{aligned}\Delta \ln(\mathrm{LE}_t) = \alpha_0 + \sum_{i=1}^{p} \alpha_i \Delta \ln(\mathrm{LE}_{t-i}) + \sum_{j=0}^{q_1} \beta_{1j} \delta \mathrm{UHC}_{t-j} + \sum_{j=0}^{q_2} \beta_{2j} \Delta \ln(\mathrm{URB}_{t-j}) + \sum_{j=0}^{q_3} \beta_{3j} \Delta \ln(\mathrm{ADM}_{t-j}) \\ + \theta_1 \ln(\mathrm{LE}_{t-1}) + \theta_2 \mathrm{UHC}_{t-1} + \theta_3 \ln(\mathrm{URB}_{t-1}) + \theta_4 \ln(\mathrm{ADM}_{t-1}) + \varepsilon_t\end{aligned}$$

where Δ denotes the first difference operator, p represents the number of lags for the dependent variable, q_1, q_2, q_3 indicate lag lengths for each respective regressor, coefficients on level terms (θ_1 through θ_4) capture long-run equilibrium relationships, and coefficients on differenced terms represent short-run dynamic adjustments. Optimal lag lengths are selected using the Schwarz Information Criterion (SIC) rather than the Akaike Information Criterion (AIC). SIC imposes stronger parsimony penalties more appropriate for small samples, with penalty $k \times \ln(T)$ where k denotes parameters and T represents sample size. With $T = 34$, SIC’s $\ln(34) \approx 3.53$ substantially exceeds AIC’s factor of 2, inducing greater parsimony and demonstrating superior small-sample performance by reducing overfitting [46, 47]. Maximum lag length is constrained to 2 given sample size considerations.

Testing for cointegration proceeds through bounds testing on the joint significance of level variables. The null hypothesis posits no cointegration:

$$\mathrm{H}_0 : \ \theta_1 = \theta_2 = \theta_3 = \theta_4 = 0$$

tested against alternatives where at least one coefficient differs from zero. Pesaran et al. [16] provide asymptotic critical value bounds: a lower bound I(0) assuming all variables are stationary, and an upper bound I(1) assuming all variables are first-difference stationary. The test statistic follows a non-standard distribution. For our application with three regressors ($k = 3$) and restricted constant specification without trend (Case II), critical values at 1% significance are I(0)=4.614 and I(1)=5.966. If F-statistic exceeds I(1), the null hypothesis is rejected and cointegration is concluded.

Upon establishing cointegration, we estimate the error correction model to quantify adjustment speeds toward long-run equilibrium:

$$\Delta \ln(\mathrm{LE}_t) = \text{short-run dynamics} + \lambda ECT_{t-1} + \varepsilon_t$$

where ECT_{t-1} represents the error correction term, calculated as deviations from the estimated long-run equilibrium relationship [48]. The coefficient λ captures the speed of adjustment toward equilibrium following short-run disturbances. Economic theory requires λ to be negative and statistically significant, with absolute values between 0 and 2 indicating stable convergence dynamics. Negative coefficients ensure error-correcting behavior, deviations from equilibrium trigger offsetting adjustments in subsequent periods. Values approaching unity suggest rapid adjustment with approximately 100% of disequilibrium corrected within one period, while magnitudes exceeding unity may indicate overshooting dynamics where the system temporarily overcorrects before converging to equilibrium.

We implement comprehensive diagnostic tests to validate model specification and ensure inference reliability. The Breusch-Godfrey Lagrange Multiplier test examines residual autocorrelation up to two lags, testing whether residuals exhibit systematic serial correlation. The Breusch-Pagan-Godfrey test assesses heteroskedasticity, determining whether error variance remains constant across observations. The Jarque-Bera test evaluates residual normality based on skewness and kurtosis. Ramsey's RESET test examines functional form specification by testing whether powers of fitted values enter significantly. CUSUM and CUSUM of Squares tests assess structural stability by examining whether recursive residuals remain within 5% significance bands. Variance Inflation Factors quantify multicollinearity severity, measuring how much standard errors are inflated due to linear relationships among regressors. These diagnostics collectively ensure coefficient estimates are unbiased and efficient, hypothesis tests maintain correct size properties, and estimated relationships reflect genuine data patterns rather than specification artifacts.

4. Data and Variables

This study employs annual time series data for Morocco spanning 1990–2023, yielding 34 observations. Data are compiled from multiple authoritative sources to ensure consistency and reliability. Life expectancy at birth data derive from the World Bank World Development Indicators database, which provides internationally comparable estimates based on national statistical office reports and demographic modeling by the United Nations Population Division. Universal health coverage indicators are sourced from Morocco's High Commission for Planning (Haut-Commissariat au Plan), supplemented by cross-validation against WHO Global Health Observatory data to ensure consistency. Urbanization rates come from United Nations Population Division urban-rural population estimates based on national census data and intercensal projections. Hospital admission statistics are compiled from Morocco's Ministry of Health annual statistical yearbooks (Annuaire Statistique du Ministère de la Santé), which aggregate facility-level data across the public and private healthcare sectors.

Life expectancy (LE) is measured as life expectancy at birth in years, representing the average number of years a newborn would live if current age-specific mortality rates remained constant throughout their lifetime. This indicator captures overall population health status and responds to both mortality reductions across age groups and changes in the age distribution of deaths. In our sample, life expectancy increased from 60.0 years in 1990 to 77.4 years in 2023, representing substantial health improvements over the study period.

Universal Health Coverage (UHC) is operationalized as the proportion of the population with health insurance coverage, expressed as a decimal fraction between 0 and 1. This measure aggregates formal insurance schemes including AMO for formal sector workers, RAMED (later AMO-Tadamon) for vulnerable populations, and various voluntary insurance arrangements. Coverage expanded from 40.8% (0.408) in 1990 to 87.0% (0.870) by 2023, with particularly rapid growth following the 2021 royal initiative establishing UHC as a national priority. We retain this variable in levels rather than logarithmic form based on both empirical considerations (log transformation of bounded proportions introduces interpretation complexities) and substantive grounds (semi-elasticity interpretation aligns with policy discourse on percentage-point coverage changes).

Urbanization rate (URB) is defined as the percentage of the total population residing in urban areas, based on national administrative definitions of urban localities. Urban population share increased from 48.4% in 1990 to 67.3% in 2023, reflecting Morocco's ongoing urban demographic transition. We apply logarithmic transformation to this variable to capture potentially diminishing marginal effects of urbanization on health outcomes and to stabilize variance given the variable's multiplicative growth pattern.

Hospital admissions (ADM) represents total annual admissions across all public and private hospital facilities in Morocco, serving as a proxy for healthcare system utilization and capacity. Admissions increased from 595,456 in 1990 to 1,246,425 in 2023, more than doubling over the study period. This variable is log-transformed given its substantial absolute growth and to enable elasticity interpretation. We acknowledge that admissions reflect both improved healthcare access (enabling previously unmet needs to be addressed) and disease burden (with higher morbidity generating more admissions), such that the net effect's sign and magnitude depend on which channel dominates in Morocco's context.

Table 1 presents summary statistics for all variables in both original and transformed specifications.

Table 1. Summary Statistics for all variables

Variable	Mean	Std. Dev.	Median	Minimum	Maximum
LE (years)	70.771	5.477	72.300	60.000	77.430
URB (%)	56.670	4.922	56.050	48.400	67.300
UHC (proportion)	0.561	0.123	0.531	0.408	0.870
ADM (number)	929,918	200,541	923,793	595,456	1,246,425
LNLE	4.256	0.080	4.281	4.094	4.349
LNURB	4.034	0.087	4.027	3.880	4.209
LNADM	13.719	0.225	13.736	13.297	14.036

Note: Sample period 1990–2023 (N=34). LE = life expectancy at birth; URB = urbanization rate; UHC = universal health coverage; ADM = hospital admissions; LN denotes natural logarithm. Jarque-Bera tests indicate approximate normality for all variables ($p > 0.10$).

5. Empirical Results

5.1. Unit Root Tests

Prior to ARDL estimation, we conduct unit root tests to verify that no variables are integrated of order two or higher, as I(2) variables invalidate ARDL bounds testing procedures. Table 2 reports Augmented Dickey-Fuller (ADF) test results with constant and trend specification. Lag lengths are selected automatically via SIC with maximum eight lags permitted.

Table 2. Augmented Dickey-Fuller (ADF) test results

Variable	Level		First Difference		Integration
	t-statistic	p-value	t-statistic	p-value	
LNLE	1.078	0.9998	-12.012***	0.0000	I(1)
LNURB	-2.347	0.3983	-6.486***	0.0000	I(1)
UHC	0.833	0.9996	-3.636**	0.0104	I(1)
LNADM	-1.378	0.8483	-9.190***	0.0000	I(1)

*Note: ADF test specification includes constant and trend. Lag length selected by SIC with maximum 8 lags. Critical values: 1% = -4.27, 5% = -3.56, 10% = -3.21. ***, **, * denote significance at 1%, 5%, and 10% levels respectively.*

Results indicate that all variables are non-stationary in levels, failing to reject the unit root null hypothesis at conventional significance levels. However, all series become stationary after first differencing, with test statistics strongly rejecting the unit root null ($p < 0.01$ for LNLE, LNURB, and LNADM; $p < 0.05$ for UHC). This confirms that all variables are integrated of order one, I(1), satisfying the prerequisite for ARDL bounds testing. Critically, no variables exhibit I(2) behavior, which would necessitate alternative estimation strategies.

5.2. Model Selection and Specification

We estimate ARDL models with lag lengths ranging from (0,0,0,0) to (2,2,2,2), encompassing 81 candidate specifications. Table 3 presents the top-ranked models based on alternative information criteria.

The BIC criterion selects ARDL(1,2,0,0) as the optimal specification, incorporating one lag of the dependent variable (LNLE), two lags of UHC, and contemporaneous values of LNURB and LNADM. This parsimonious structure reflects the finding that UHC effects on life expectancy exhibit distributed lag dynamics requiring two periods to fully materialize, while urbanization and hospital admissions operate primarily through contemporaneous channels. The AIC would favor more heavily parameterized models, particularly ARDL(2,2,1,0)

Table 3. Model Selection Criteria

Model	LogL	AIC	BIC*	HQ	Specification
36	86.492256	-4.968268	-4.647636	-4.861988	ARDL(1,2,0,0)
6	89.819972	-5.051248	-4.639010	-4.914603	ARDL(2,2,1,0)
9	87.825644	-4.989103	-4.622669	-4.867640	ARDL(2,2,0,0)
33	87.354935	-4.950683	-4.593249	-4.838221	ARDL(1,2,1,0)
35	87.105977	-4.944124	-4.577690	-4.822661	ARDL(1,2,0,1)
3	90.037298	-5.002331	-4.544289	-4.850503	ARDL(2,2,2,0)
8	88.267467	-4.954217	-4.541978	-4.817571	ARDL(2,2,1,1)

Note: Models ranked by BIC (denoted BIC for emphasis). LogL = log-likelihood; AIC = Akaike Information Criterion; BIC = Schwarz/Bayesian Information Criterion; HQ = Hannan-Quinn Information Criterion [49]. Lower values indicate better fit. Sample: 1992-2023 (32 observations after adjustments). Dependent variable: LNLE.*

or ARDL(2,2,2,0), but we prioritize BIC's stronger penalty for complexity given our limited sample size. As discussed in the methodology section, BIC demonstrates superior small-sample performance by reducing overfitting risks and selecting specifications that maintain better generalization properties.

5.3. *Bounds Test for Cointegration*

Table 4 reports the bounds test for cointegration based on the selected ARDL(1,2,0,0) specification.

Table 4. Bounds Test Results

Test Statistic	Value	Significance	I(0) Bound	I(1) Bound
F-statistic	24.890	10%	2.897	3.770
		5%	3.475	4.430
		1%	4.614	5.966

Note:Null hypothesis H_0: no cointegration. Critical values from Pesaran et al. [16] Table CI(iii) Case II: restricted constant, no trend, k=3 regressors. I(0) assumes all regressors are I(0); I(1) assumes all are I(1). Decision rule: reject H_0 if F-statistic $>$ I(1) bound.

The computed F-statistic of 24.890 substantially exceeds the upper bound critical value of 5.966 at the 1% significance level. This provides overwhelming evidence against the null hypothesis of no cointegration, providing strong evidence supporting the existence of a long-run relationship among life expectancy, universal health coverage, urbanization, and hospital admissions in Morocco over the study period. The magnitude by which the test statistic exceeds the critical value, more than four times the upper bound, indicates robust cointegration, suggesting the estimated long-run relationship reflects genuine economic linkages rather than spurious correlation. This result should nonetheless be interpreted alongside the structural stability discussion in Section 5.6, which identifies potential parameter instability in the post-2021 reform period.

5.4. *Long-Run Coefficient Estimates*

Having established cointegration, we now examine the long-run equilibrium relationship. Table 5 presents the estimated long-run coefficients derived from the ARDL(1,2,0,0) model.

All three determinants exert statistically significant effects on life expectancy at the 1% level, with coefficients exhibiting theoretically consistent signs. The UHC coefficient of 1.199 is statistically significant ($p < 0.001$), indicating a robust positive long-run association between coverage expansion and life expectancy. Given the severe multicollinearity present in the model (Section 5.7), we deliberately refrain from interpreting the magnitude of this coefficient as a precise, isolated causal effect. Instead, we anchor interpretation within the observed sample variation: over the study period, UHC coverage increased from 40.8% in 1990 to 87.0% in 2023, a within-sample increase of approximately 46 percentage points. The model estimates that this observed coverage trajectory, occurring alongside urbanization and healthcare infrastructure development, is associated with a meaningful

Table 5. Long-Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	p-value
UHC	1.199	0.160	7.499	0.0000
LNURB	2.060	0.239	8.621	0.0000
LNADM	0.121	0.027	4.553	0.0001
Constant	-5.070	0.687	-7.383	0.0000

Note: Long-run coefficients calculated from the cointegrating equation. All coefficients significant at 1% level. Dependent variable: LNLE (natural logarithm of life expectancy).

positive shift in log life expectancy consistent with the population health improvements documented over this period. The primary finding is therefore the statistically significant positive sign of the UHC coefficient, which supports the direction, though not a precise magnitude, of coverage expansion on population health outcomes. This interpretation is more appropriate given the collinear structure of regressors, which precludes the isolation of independent marginal effects with confidence.

Urbanization emerges as the quantitatively dominant predictor, with an elasticity of 2.060. This implies that a 1% increase in urban population share associates with approximately 2.06% increase in life expectancy, a substantial magnitude. At the sample mean life expectancy of 70.77 years, this translates to 1.46 additional years per 1% urbanization increase. This large effect likely reflects multiple channels through which urbanization facilitates health improvements: superior healthcare infrastructure in urban areas, reduced travel distances to medical facilities, greater concentration of specialized providers, better access to sanitation and clean water, and higher educational attainment among urban populations. The magnitude also suggests potential threshold effects, where movement from predominantly rural to urban residence generates particularly large health gains. However, we acknowledge that this estimate may be inflated by multicollinearity between urbanization and other omitted development indicators that correlate with both urban residence and health outcomes.

Hospital admissions demonstrate a positive elasticity of 0.121, statistically significant at the 1% level. This suggests that a 1% increase in annual hospital admissions associates with a 0.121% increase in life expectancy, equivalent to approximately 0.09 years (33 days) at the sample mean. The positive coefficient indicates that the healthcare access channel dominates the disease burden interpretation, higher admissions reflect improved ability to treat conditions requiring hospitalization rather than elevated morbidity. This finding aligns with Morocco's healthcare system expansion, where rising admissions likely capture previously unmet needs being addressed as coverage and facility availability improve rather than worsening population health status necessitating more frequent hospitalization.

5.5. *Error Correction Model and Short-Run Dynamics*

The error correction representation reveals how the system adjusts toward long-run equilibrium following short-term disturbances. Table 6 presents the error correction model estimates.

Table 6. Short-Run Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	p-value
CointEq(-1)	-1.611	0.134	-12.014	0.0000
D(UHC)	0.194	0.165	1.184	0.2469
D(UHC(-1))	0.962	0.184	5.218	0.0000

Note: D denotes first difference operator. CointEq(-1) represents the lagged error correction term. Model diagnostics: $R^2 = 0.947$, *Adjusted* $R^2 = 0.933$, *F-statistic* $= 73.95$ *(*$p < 0.001$*), Durbin-Watson* $= 2.50$.

The error correction term carries a coefficient of -1.611, highly significant at the 1% level (t = -12.014, p < 0.001). The negative sign confirms error-correcting behavior, when life expectancy deviates below its long-run equilibrium in period t-1, the system adjusts upward in period t to restore equilibrium. The magnitude exceeding unity in absolute value signals overshooting adjustment dynamics: rather than converging monotonically, the system temporarily overcorrects before settling into equilibrium through dampened oscillations. This pattern is consistent with an abrupt, policy-driven shock to the system, specifically Morocco's accelerated UHC expansion initiated in April 2021, which may have generated rapid health system responses that temporarily exceeded the long-run equilibrium trajectory before moderating. It is important to note that an ECT coefficient below -1 does not imply that more than 100% of a disequilibrium is corrected within a single period in a simple additive sense; rather, it characterizes the oscillatory nature of the convergence path. Such overshooting behavior, while less common than standard monotonic adjustment, is not theoretically implausible in contexts where major policy interventions produce sharp, concentrated system-wide responses. The CUSUM of Squares instability around 2020-2022 (discussed in Section 5.6) provides corroborating evidence that the post-2021 reform introduced structural dynamics that the model partially captures through this rapid, overshooting adjustment mechanism.

Short-run UHC dynamics reveal interesting temporal patterns. The contemporaneous UHC change proves statistically insignificant (coefficient $= 0.194$, $p = 0.247$), suggesting coverage expansions do not immediately translate into life expectancy gains within the same year. However, the one-period lagged UHC change exhibits strong positive effects (coefficient $= 0.962$, $p < 0.001$), indicating that coverage increases generate significant health improvements approximately one year later. This lagged effect structure aligns with theoretical expectations, health coverage impacts mortality through multiple channels (increased preventive care utilization, earlier chronic disease detection, improved medication adherence, reduced financial barriers to treatment) that require time to materialize into observable survival gains. The one-year lag likely captures the minimum period necessary for expanded coverage to translate into reduced mortality through these mechanisms.

5.6. Diagnostic Tests and Model Validation

Table 7 summarizes diagnostic test results assessing model specification adequacy and identifying potential assumption violations.

Table 7. Diagnostic Tests Results

Diagnostic Test	**Test Statistic**	**p-value**	**Conclusion**
Breusch-Godfrey LM (2 lags)	F = 2.574	0.098	No serial correlation
Breusch-Pagan-Godfrey	F = 3.063	0.022	Heteroskedasticity detected
Jarque-Bera	JB = 1.406	0.495	Normality maintained
Ramsey RESET	F = 2.428	0.023	Potential nonlinearity

Note: Null hypotheses: LM (no serial correlation), BP (homoskedasticity), JB (normality), RESET (correct functional form).

The Breusch-Godfrey LM test fails to reject the null hypothesis of no serial correlation at conventional significance levels ($p = 0.098$), indicating that residuals do not exhibit systematic autocorrelation that would invalidate standard errors and hypothesis tests. The Jarque-Bera test similarly supports the null hypothesis of normally distributed residuals ($p = 0.495$), suggesting that inference based on t-statistics and F-statistics remains appropriate despite the small sample size.

However, the Breusch-Pagan-Godfrey test detects heteroskedasticity at the 5% significance level ($p = 0.022$), indicating non-constant error variance across observations. This likely reflects changing volatility across Morocco's development trajectory, relatively stable health transitions in early sample periods (1990s) contrasted with more rapid fluctuations during reform implementations (RAMED introduction 2012, universal coverage initiative 2021-2022). While heteroskedasticity reduces estimation efficiency and inflates standard errors, coefficient estimates remain consistent under general heteroskedasticity. The fact that all key coefficients maintain high statistical significance ($p < 0.001$) despite heteroskedasticity-induced efficiency losses suggests robust identification of underlying relationships. Future analysis could employ heteroskedasticity-robust standard errors to strengthen inference, though this approach proves challenging within ARDL frameworks lacking readily available robust covariance estimators in standard software.

The Ramsey RESET test marginally rejects the null hypothesis of correct functional form ($p = 0.023$), suggesting potential omitted variables or nonlinear relationships. Given our strong theoretical foundations and cointegration evidence, this results more likely reflects genuine nonlinearities in health production, for instance, diminishing returns to urbanization or threshold effects in coverage expansion, rather than fundamental misspecification. The log-linear specification we employ accommodates certain nonlinearities through logarithmic transformations, but more flexible functional forms (polynomial terms, spline specifications) could be explored in future research with larger samples permitting additional parameterization.

Figures 1 and 2 present CUSUM and CUSUM of Squares tests for parameter stability. The CUSUM statistic remains largely within 5% significance bands throughout the sample period (Figure 1), suggesting absence of systematic drift in coefficients. However, the CUSUM of Squares statistic exits the bands around 2020–2022 (Figure 2), indicating variance instability or potential structural change during this period. This timing corresponds precisely to Morocco's major UHC reform initiation in April 2021 and must be treated as a significant methodological concern rather than a mere confirmation of model success. The instability identified by the CUSUM of Squares test raises a critical question: does a single, stable long-run cointegrating relationship hold across the entire 1990–2023 period, or have the dynamics governing life expectancy fundamentally shifted following the 2021 reform? Pooling pre- and post-reform observations under a single equilibrium assumption risks producing an "average" relationship that may not accurately represent either regime. The rapidly changing dynamics of the post-2021 period, rapid enrollment acceleration, AMO-Tadamon transition, and system-wide restructuring, likely differ qualitatively from the gradual expansion dynamics of 1990–2020. The conclusion that a stable long-run relationship exists for the entire 1990–2023 period must therefore be tempered. While the bounds test confirms cointegration, the structural instability evidence suggests this relationship may have undergone a regime shift following the 2021 reform. With only three post-reform observations (2021–2023), statistical identification of a new long-run equilibrium is severely limited. This is explicitly acknowledged as a key limitation of the present analysis, and future work with a longer post-reform time series will be necessary to confirm whether the estimated equilibrium relationship holds under the new coverage regime.

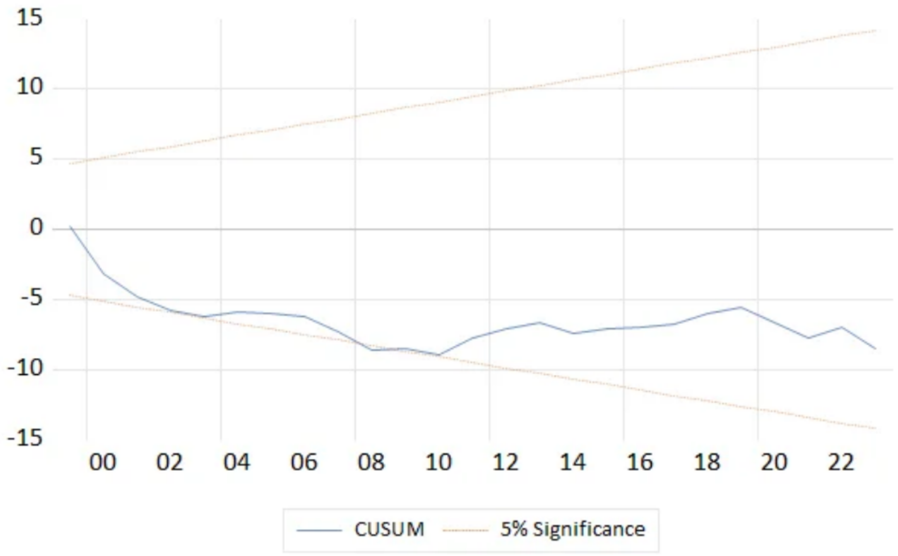

Figure 1. CUSUM Test for Parameter Stability.

5.7. *Multicollinearity Assessment*

Table 8 presents Variance Inflation Factors (VIF) quantifying the degree of multicollinearity among regressors.

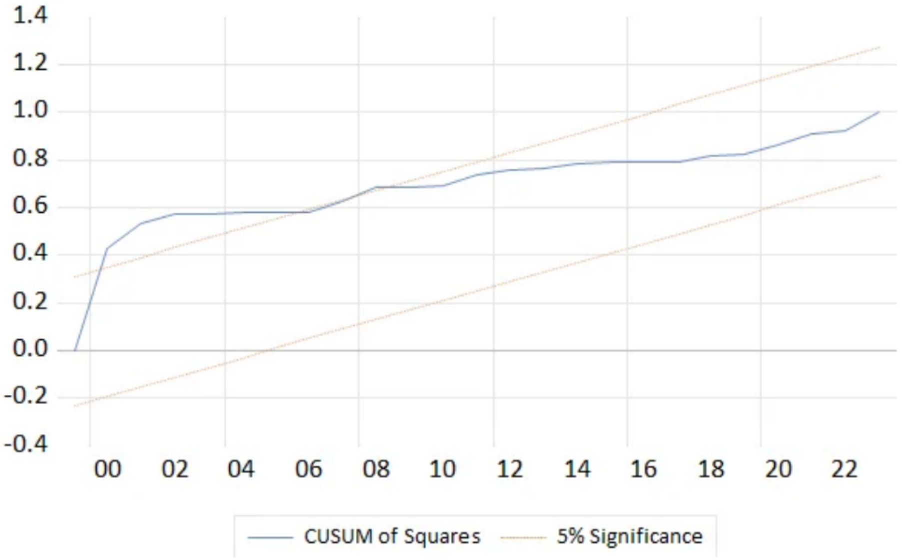

Figure 2. CUSUM of Squares Test for Parameter Stability.

Table 8. Variance Inflation Factor (VIF)

Variable	Centered VIF
UHC	418.24
LNURB	80,567.12
LNADM	31,559.37

Note: VIF quantifies how much coefficient standard errors are inflated due to collinearity with other regressors. Values exceeding 10 conventionally indicate problematic multicollinearity, though this threshold lacks strong theoretical justification.

VIF values substantially exceed conventional rule-of-thumb thresholds, indicating strong linear relationships among regressors. Urbanization and hospital admissions exhibit particularly high VIFs (80,567 and 31,559 respectively), while UHC demonstrates elevated though comparatively moderate collinearity (VIF = 418). This pattern reflects inherent developmental correlations, UHC expansion in Morocco occurred concurrently with urbanization and healthcare infrastructure development as components of integrated socioeconomic progress. Urban areas typically receive priority in health facility investment, creating natural correlation between urban residence and healthcare access. Similarly, higher coverage enables greater utilization, mechanically linking UHC to hospital admissions.

Despite elevated multicollinearity, we retain all variables in the final specification for several reasons grounded in econometric theory and substantive considerations. First, multicollinearity inflates standard errors and reduces coefficient precision but does not bias point estimates, our highly significant results ($p < 0.001$ for all regressors) suggest sufficient statistical power remains despite efficiency losses. The t-statistics substantially exceed critical values (all $t > 4.5$), indicating that collinearity has not degraded precision to levels preventing inference. Second, all variables demonstrate both statistical and economic significance with theoretically consistent signs, suggesting each captures unique variation despite correlation. Omitting any variable would induce omitted variable bias if that factor truly influences life expectancy, as theory and prior evidence strongly suggest. Third, the multicollinearity reflects genuine developmental processes rather than measurement error or data deficiency, UHC, urbanization, and healthcare infrastructure genuinely co-evolve in Morocco's context. Attempting to eliminate collinearity through variable exclusion would sacrifice theoretical completeness and policy relevance. Fourth, strong cointegration evidence and satisfactory diagnostic performance (excepting heteroskedasticity) indicate the model successfully identifies long-run relationships despite collinearity. The ARDL bounds test's overwhelming rejection of no cointegration (F = 24.89 >> 5.966) demonstrates robust identification of equilibrium relationships.

We acknowledge this limitation explicitly and fundamentally in interpreting results. The coefficient estimates must be understood as capturing each variable's effect conditional on the observed correlation structure among regressors, rather than representing independently isolated effects. The UHC coefficient reflects coverage impacts holding constant the typical developmental co-movement between coverage, urbanization, and healthcare utilization observed in Morocco's data, not the effect of hypothetically varying UHC in isolation. This is a substantive constraint on inference: we cannot claim to have disentangled the independent marginal contribution of UHC from those of co-evolving developmental processes. This constraint naturally raises the question of why all three regressors are retained despite the extreme collinearity, rather than estimating a more parsimonious specification. The answer lies in omitted variable bias: excluding urbanization or hospital admissions from the model would bias the UHC coefficient if these variables genuinely influence life expectancy through independent channels, which both theory and prior evidence strongly suggest they do. Removing LNURB would conflate UHC's effect with the urbanization-driven improvements in healthcare access, sanitation, and education that co-evolved with coverage expansion. Removing LNADM would fail to account for the utilization channel through which coverage translates into health gains. In both cases, the resulting coefficient on UHC would capture a composite effect rather than a cleaner estimate. The full model, despite its multicollinearity, remains the theoretically correct specification for Morocco's integrated developmental context. The implication is not that the model is misspecified, but that the individual coefficient magnitudes must be interpreted as conditional estimates reflecting the joint developmental process rather than isolated causal effects. The conditional interpretation of the full model nonetheless proves policy-relevant: decision-makers cannot realistically expand coverage in complete isolation from broader development patterns. Future research employing instrumental variable approaches or quasi-experimental designs exploiting exogenous variation in coverage timing could further strengthen causal identification.

6. Discussion

This study provides econometric evidence that Universal Health Coverage expansion in Morocco is statistically significantly associated with life expectancy improvements over 1990–2023. The ARDL cointegration framework establishes evidence of a long-run equilibrium relationship, with UHC exhibiting a robustly positive coefficient after controlling for urbanization and healthcare utilization. Given the inherent correlations among developmental indicators and the structural dynamics of the post-2021 reform period, we focus our interpretation on the direction and statistical significance of the UHC association rather than its precise numerical magnitude. The positive and highly significant UHC coefficient in the baseline specification provides directional evidence supporting the relationship between coverage expansion and population health outcomes in Morocco, in line with international evidence on health insurance impacts.

These findings carry several policy implications for Morocco's ongoing UHC implementation. The significant positive association provides empirical support for the 2021 universal coverage initiative, suggesting investments in coverage expansion correlate with measurable population health improvements. The lagged effects structure, significance emerging at $t-1$ rather than contemporaneously, indicates health gains materialize gradually, requiring sustained commitment beyond initial enrollment phases. Policymakers should anticipate 1-2 year lags before coverage expansion translates into observable mortality reductions, tempering expectations for immediate demographic impacts while maintaining long-term programmatic support.

Urbanization's quantitatively dominant role highlights that UHC operates within broader developmental contexts rather than in isolation. Urban areas' superior health outcomes reflect not only coverage but also facility density, provider availability, sanitation infrastructure, and educational access. This suggests UHC effectiveness depends critically on complementary investments in healthcare delivery capacity, particularly in rural areas where baseline infrastructure may prove insufficient to translate coverage into actual utilization. Morocco's policy agenda should therefore integrate coverage expansion with targeted rural health infrastructure development, provider training programs, and supply chain strengthening to ensure equitable access realization across geographic areas. Simply extending insurance eligibility without corresponding service delivery capacity risks generating coverage-utilization gaps where nominal insurance fails to translate into actual healthcare access.

The strong multicollinearity between UHC and developmental indicators, while complicating statistical inference, reflects a substantive insight, health coverage expansion proves most effective when embedded within integrated development strategies. Attempts to isolate UHC's pure independent effect, while methodologically appealing, may sacrifice policy relevance if real-world implementation necessarily occurs alongside urban development, infrastructure investment, and economic growth. Our conditional estimates therefore provide useful policy parameters despite not representing fully isolated causal effects.

Several methodological considerations merit discussion. The heteroskedasticity detected likely reflects changing volatility across Morocco's development phases, gradual transitions pre-2000, moderate reform 2000–2020, rapid expansion post-2020. While affecting efficiency, our coefficients remain consistent and highly significant despite this issue. The CUSUM of Squares instability around 2020–2022 is acknowledged as a genuine limitation: it indicates that the long-run relationship between UHC and life expectancy may have undergone a structural shift following the 2021 reform, which casts some doubt on the assumption of a single stable equilibrium spanning the full 1990–2023 period. Future analyses with a longer post-reform time series will be essential to confirm whether the relationship estimated here holds under the new coverage regime.

Our findings align with cross-national evidence documenting positive coverage-health associations while providing richer temporal dynamics than cross-sectional analyses permit. The effect magnitude compares favorably to the estimated long-run association is consistent with the direction of effects reported in studies of insurance expansion in comparable middle-income settings, where health gains tend to be larger where baseline coverage was lower prior to reform [13]. The lagged adjustment structure, with health effects materializing over one to two years, is broadly consistent with the time horizons identified in evaluations of large-scale insurance reforms in similar contexts.

7. Conclusion

This study examines the relationship between Universal Health Coverage and population health in Morocco using time series econometric methods spanning three decades (1990–2023). Employing ARDL bounds testing, we find evidence of cointegration among life expectancy, UHC, urbanization, and healthcare utilization, with UHC demonstrating a consistently positive and statistically significant association with life expectancy. However, the results must be interpreted with important caveats: extreme multicollinearity among regressors precludes isolation of independent coefficient magnitudes, and structural instability detected by the CUSUM of Squares test around 2020–2022 suggests the long-run equilibrium may have shifted following the 2021 reform. The primary contribution of this analysis is therefore directional: it establishes that Morocco's sustained UHC expansion is associated with life expectancy gains over the study period. Several key empirical findings emerge. The cointegration evidence (F-statistic = 24.89, substantially exceeding critical values) supports the existence of a long-run relationship among health coverage, developmental indicators, and population health, subject to the caveat of possible structural change in the post-2021 period. UHC demonstrates a positive association with life expectancy (coefficient = 1.199, $p < 0.001$), with emphasis appropriately placed on sign and significance rather than precise magnitude given collinearity constraints. Urbanization emerges as a quantitatively large predictor (elasticity = 2.060), reflecting that UHC operates within broader developmental contexts and likely proxies for multiple co-evolving factors. The error correction mechanism indicates overshooting adjustment dynamics, while lagged effect structures confirm health improvements require time to materialize, necessitating sustained policy commitment beyond initial implementation phases.

For policymakers, these findings provide empirical support for Morocco's universal coverage agenda while highlighting critical implementation considerations. The positive UHC-health association validates continued investment in coverage expansion, particularly given Morocco's achievement of 86.48% coverage by 2024, positioning the nation as a regional leader in health system reform. However, urbanization's dominant role suggests effectiveness depends critically on parallel infrastructure development, particularly targeting rural areas with limited baseline capacity where the urban-rural health divide remains substantial. The lagged temporal structure implies patience proves essential, observable mortality improvements require 1-2 years to emerge following coverage gains, underscoring the importance of sustained political commitment during transition periods when costs are immediate but benefits remain latent. The substantial correlation between coverage and development indicators, rather than merely representing a statistical challenge, reflects an important substantive insight: integrated approaches combining health coverage, infrastructure investment, and urban development likely prove more effective than isolated health sector interventions.

Several considerations inform interpretation of our findings and suggest directions for future investigation. Our analysis relies on annual national-level data (N=34), which limits examination of regional or demographic heterogeneity; disaggregated analyses would enable richer insights into differential UHC effects across population subgroups. Our UHC measure captures coverage breadth, the proportion of the population holding formal health insurance, but does not reflect coverage depth (comprehensiveness of the benefits package) or quality of care delivered. A population can be nominally “covered” while facing a highly restricted benefits package, inadequate provider networks, or supply-side barriers that prevent effective utilization. This distinction is particularly relevant in Morocco’s context, where rapid enrollment growth may have outpaced infrastructure development in certain regions. Our coefficient therefore captures the association between enrollment expansion and health outcomes, but cannot distinguish between the effects of coverage per se and the complementary investments in service delivery that accompanied it. Future research incorporating multidimensional UHC metrics, combining breadth, depth, and financial protection indicators, would enable more precise identification of the mechanisms driving health improvements. Focusing exclusively on life expectancy provides a summary measure but does not capture effects on specific causes of mortality or morbidity; broader outcome measures would enable more complete assessment. The recent 2021–2022 UHC expansion provides limited post-reform observations; extended time series will better identify whether initial health gains persist as coverage matures. Future research examining heterogeneous effects across urban-rural settings, income groups, and age cohorts would inform targeting strategies and equity considerations. Investigating transmission mechanisms, whether UHC operates primarily through increased utilization, financial protection, or earlier disease detection, would provide actionable insights for benefit design optimization. Cost-effectiveness analyses comparing UHC investments to alternative health interventions would guide resource allocation decisions in resource-constrained settings.

This research contributes to health economics literature by providing rigorous time series evidence on UHC impacts in a middle-income North African context, extending the predominantly cross-sectional and high-income country focus of prior work. The ARDL methodology proves well-suited for examining gradual policy implementation in small samples, offering a template for evaluations in similar settings. The consistent pattern of results across multiple specifications and diagnostic tests suggests robust identification of genuine long-run relationships. As Morocco continues its universal coverage journey, these findings provide both validation of progress achieved and guidance for policy refinements aimed at maximizing population health gains. Sustaining these improvements requires continued attention to implementation quality, ensuring adequate provider networks, maintaining service quality standards, and monitoring actual utilization patterns rather than relying solely on nominal coverage statistics. Geographic equity considerations remain paramount, as rural-urban disparities in healthcare infrastructure may limit UHC’s potential to reduce health inequalities without targeted complementary investments in underserved areas.

In conclusion, Morocco’s UHC expansion demonstrates measurable associations with improved population health outcomes over the past three decades. The path forward requires integrating continued coverage expansion with strengthened service delivery capacity, quality assurance mechanisms, and equity-focused targeting to ensure all segments of society benefit from universal health protection. The experience provides valuable lessons for other middle-income countries pursuing similar reforms: effects are substantial but gradual, success requires complementary infrastructure investments, and integrated developmental approaches combining health, urbanization, and economic policies yield greatest impact. As the global community pursues Sustainable Development Goal 3.8 calling for universal health coverage by 2030, Morocco’s experience offers empirical evidence that sustained investment in UHC, coupled with broader health system strengthening, can deliver meaningful improvements in population health and contribute to more equitable and resilient societies.

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