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Economic Evaluation of the Costs of Diabetes-Related Complications in Algeria: A Multicenter Real-World Study & 3-Year Budget Impact Model

ISPOR POSTER CODE

EE325

D. DACI[1], M. CHALLEL[2], Z. HAICHEUR[2], D. NADIR[3], A. AFTIT[1], R. BENSEMMANE[1], [3]

[1] Department of Pharmacy, Faculty of Pharmacy, Algiers University 1, Algiers, Algeria | [2] Novo Nordisk Algeria, Algiers, Algeria | [3] Directorate for the Prevention of Non-Communicable Diseases, Ministry of Health, Algiers, Algeria

18,287 Patients
Multicenter Real-World Cohort
89.7% with controlled diabetes (n=16,386) | 10.3% with complicated diabetes (n=1,901) across Algerian clinics

14.4% Adult Prevalence
High National Epidemiological Burden
3.76M diabetic adults in 2024 → 3.88M by 2026 (STEPwise); +8.2% prediabetic

€767 / Patient / Yr
Peak Complication Direct Cost
Cardiovascular (+88.9%) & PAD (+76.4%) nearly double the €862 IDF baseline cost

€475.2M / Yr by 2026
National Complication Expenditure
10.3% of patients with complications consume 70.3% of Algeria's diabetes budget

1. INTRODUCTION & PUBLIC HEALTH CONTEXT

▸ **Global vs. National Prevalence Surge:** Global adult diabetes prevalence (ages 20-79) reached 10.5% in 2021 and is projected to hit 12.2% by 2045 (IDF). In Algeria, the WHO STEPwise survey recorded an adult prevalence (ages 19-69) of 14.4%, with an additional 8.2% exhibiting impaired fasting glycemia (1.10-1.60 g/L).

▸ **Severe Vascular Progression:** Chronic hyperglycemia and metabolic risk factors drive life-threatening macrovascular complications: myocardial infarction (MI), angina, heart failure, transient ischemic attack (TIA), stroke, peripheral artery disease (PAD), and diabetic foot; alongside microvascular damage (retinopathy, nephropathy, neuropathy).

▸ **Real-World Socio-Behavioral Barriers:** In Algeria, optimal glycemic control is frequently hindered by low health literacy in elderly populations, poor adherence to lifestyle/dietary measures, and cultural reliance on traditional herbal medicine.

▸ **Escalating Economic Burden:** Global direct diabetes expenditure rose 316% over 15 years ($232B in 2007 to $966B in 2021). While the IDF estimates average annual spending per diabetic patient in Algeria at €862, local real-world cost disaggregation by specific vascular complication has remained unquantified.

2. OBJECTIVES & MULTICENTER STUDY DESIGN

PRIMARY STUDY OBJECTIVE

To evaluate the annual direct medical costs of managing controlled diabetes and its macro- and microvascular complications in Algeria (medications, follow-up exams, and hospital interventions), compare per-patient costs against the IDF benchmark (€862), and project the 3-year national budget impact (2024–2026).

▸ **Study Design & Registry:** Retrospective, multicenter pharmacoeconomic study of N = 18,287 diabetic patients enrolled in the national 'Barometer Changing Diabetes® Algeria' electronic database across public diabetes centers.

▸ **Target Population & Inclusion Criteria:** Male and female patients aged >18 years with Type 1 or Type 2 diabetes, with or without complications, followed for ≥1 year in outpatient consultation by the same physician/facility, with signed informed consent.

▸ **Patient Demographics:** Mean age of 69 years; female predominance (sex ratio = 1.43). Exactly 10.3% (n = 1,901) presented ≥1 complication vs. 89.7% (n = 16,386) with controlled diabetes.

▸ **Analytical Complication Cohort (N = 1,221):** Focusing on structured chronic complication costs, 680 cases of acute glycemic imbalance (hypoglycemia) without chronic complication regimens were excluded, leaving 1,221 actively managed complication cases.

3. COSTING METHODOLOGY & BIA MODELING

Step 1. Barometer Changing Diabetes® Platform
Extraction of prescribed therapeutic classes & patient complication profiles (N = 18,287)

Step 2. Clinical Guidelines & Clinical Expert Survey
MoH Diabetology Guidelines + specialist interviews at UHC Issad-Hassani → 1st-line treatments & exam frequencies

Step 3. National Pharmaceutical Nomenclature
April 30, 2024 Algerian Nomenclature → selection of approved dosages, strengths & pack sizes

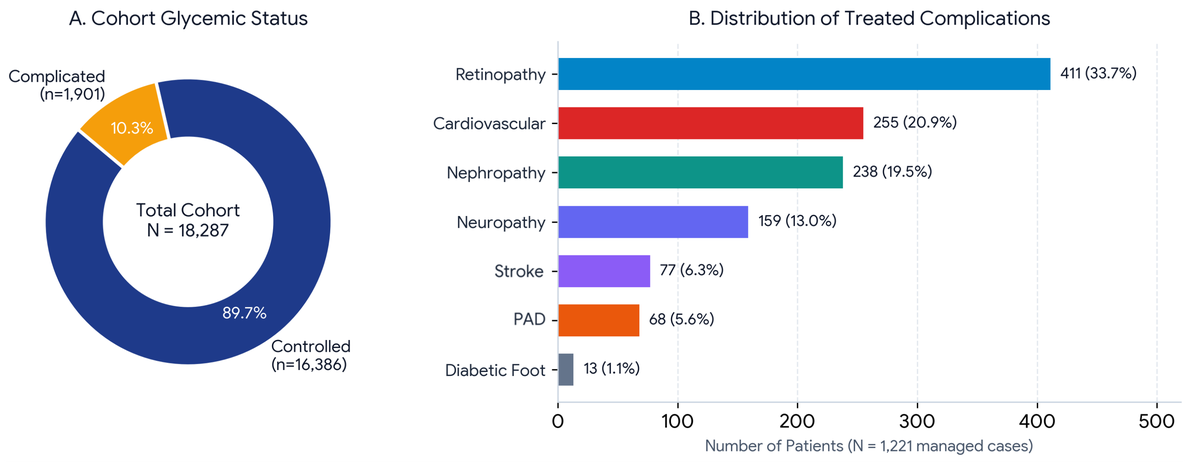
Step 4. Product SmPC
Determination of Usual Initial Daily Dose (UID) and annual therapeutic volume per molecule

Step 5. CHIFA System & Private Sector Tariffs
Community pharmacy reference prices (listed in the CHIFA system) + private imaging, lab, cardiology & ophthalmology tariffs

ANNUAL COMPLICATION COST FORMULA

Annual Cost = ∑ (PIU Drug Price × Annual Freq × Pop) + ∑ (Control Exam Price × Annual Freq × Pop) + ∑ (Hospital Intervention Price × Annual Freq × Pop)

4. EPIDEMIOLOGICAL PROFILE OF DIABETIC COMPLICATIONS (FIG. 1A & 1B)



Key Epidemiological Insight: Among N = 1,221 patients treated for chronic vascular complications, microvascular disease dominates patient volume ; Retinopathy (33.7%, n=411) and Nephropathy (19.5%, n=238), whereas Cardiovascular disease (20.9%, n=255) leads macrovascular morbidity.

5. STANDARDIZED CLINICAL MANAGEMENT PROTOCOLS IN ALGERIA (TABLE 1)

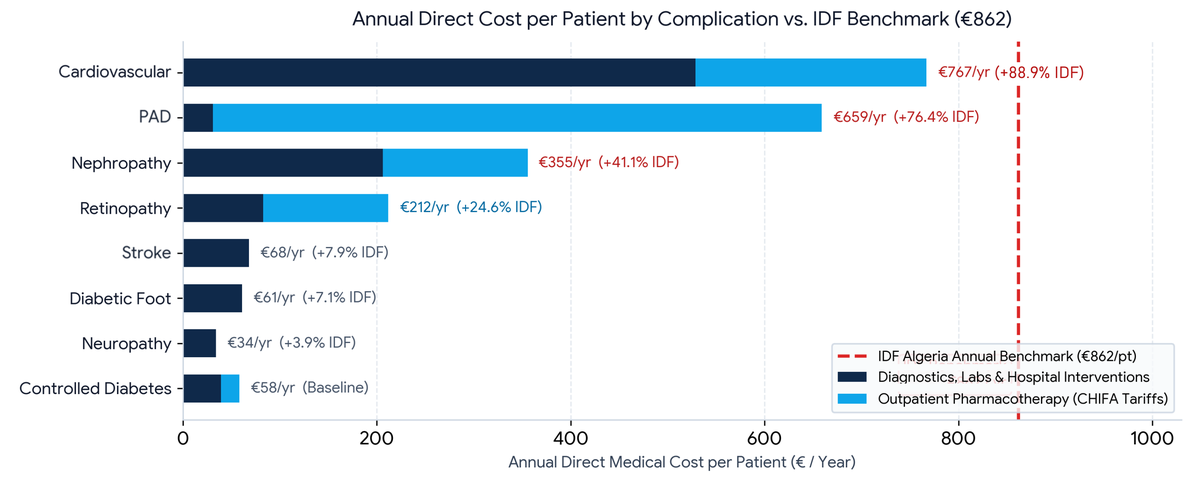
Clinical State / Complication	Outpatient Pharmacotherapy Regimen	Hospital / Interventional Care & Follow-Up
Controlled Diabetes	Oral Antidiabetics (mono/dual therapy), OAD + Insulin, or Insulin	Routine HbA1c, fasting glycemia, lipid panel & annual screening
Uncontrolled Diabetes	OAD + Insulin intensification or multi-daily Insulin injections	Frequent glycemic titration, self-monitoring consumables & specialist visits
Myocardial Infarction & Angina	Antiplatelets, Anticoagulants, Beta-blockers, Diuretics, ARB/ACEi, Statins	Emergency insulin protocol, Coronary Angioplasty (stent) or CABG bypass
Peripheral artery disease (PAD)	Antiplatelets, Anticoagulants, Statins, ACE Inhibitors	Arterial Doppler ultrasound, peripheral Angioplasty (stent) or vascular bypass
Diabetic Foot	Targeted Empirical / Adapted Antibiotic Therapy & local wound care	Podiatric assessment, surgical debridement up to lower-limb amputation
Diabetic Neuropathy	Symptomatic neuropathic pain management (first-line analgesics/neurotropics)	Clinical neurological examination & electromyography follow-up
Diabetic Retinopathy	Strict blood pressure & glycemic control (ACE Inhibitors)	Fundoscopy, OCT imaging, Laser Photocoagulation & intravitreal Anti-VEGF
Diabetic Nephropathy	BP & secondary complication control (anemia, hyperkalemia): ACEi, ARB, CCB, Diuretics	Renal function panel (eGFR/albuminuria), Peritoneal/Hemodialysis, Renal Transplant

6. ANNUAL DIRECT MEDICAL COSTS BY COMPLICATION & IDF COMPARISON (TABLE 2)

Complication Category	Exams & Interv.	Medications	Patients (N)	Total Cost (€)	Cost / Pt / Yr	% of IDF (€862)
Cardiovascular (Macro)	€134,783	€60,803	255	€195,586	**€767**	**88.9%**
PAD (Macro)	€2,105	€42,708	68	€44,813	**€659**	**76.4%**
Stroke (Macro)	€5,243	N/A*	77	€5,243	**€68**	**7.9%**
Diabetic Foot (Macro)	€796	N/A*	13	€796	**€61**	**7.1%**
Nephropathy (Micro)	€49,072	€35,609	238	€84,681	**€355**	**41.1%**
Retinopathy (Micro)	€34,129	€53,039	411	€87,167	**€212**	**24.6%**
Neuropathy (Micro)	€5,468	N/A*	159	€5,468	**€34**	**3.9%**
Subtotal Complicated	**€231,596**	**€192,159**	**1,221**	**€423,753**	**€347 (avg)**	**40.3%**
Controlled Diabetes	**€642,367**	**€314,307**	**16,386**	**€956,674**	**€58**	**6.7%**

**Note: For Stroke, Diabetic Foot, and Neuropathy, outpatient medication & surgical/hospitalization costs were excluded due to high case-by-case heterogeneity and incomplete registry charting. Complication costs represent incremental disease-specific outlays.*

7. PER-PATIENT COST DISAGGREGATION VS. IDF BENCHMARK (FIG. 2)

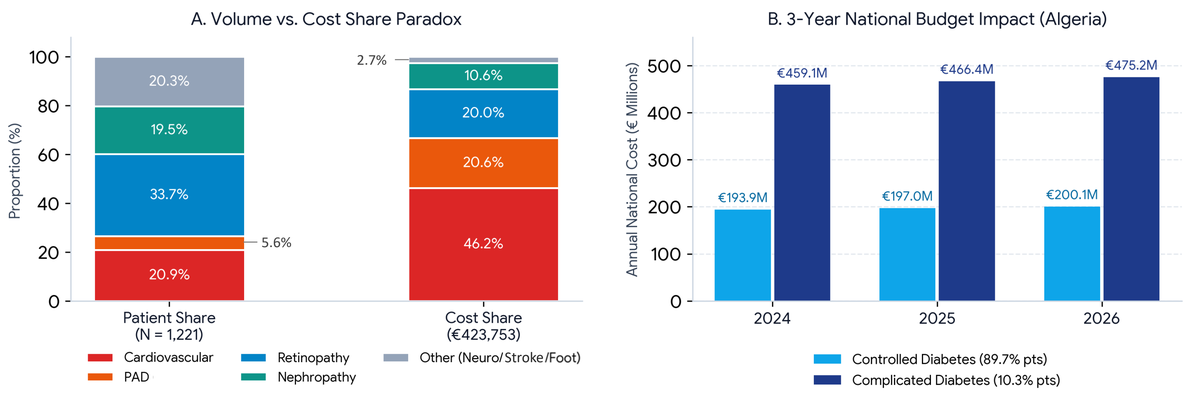


Critical Cost Driver: Cardiovascular (€767/yr) or PAD (€659/yr) adds 76% to 89% on top of the IDF baseline annual cost of diabetes in Algeria (€862/yr), whereas controlled diabetes requires only €58/patient/yr in direct routine care.

8. 3-YEAR NATIONAL BUDGET IMPACT EXTRAPOLATION: ALGERIA 2024-2026 (TABLE 3)

National Sub-Population / Stratum	Share (%)	2024 Pop (N)	2024 Cost (€)	2025 Cost (€)	2026 Cost (€)
Controlled Diabetes (€58/yr)	**89.7%**	**3,343,385**	**€193,916,302**	**€197,018,963**	**€200,121,623**
Retinopathy (€212/yr)	33.7%*	129,378	€139,055,659	€141,280,549	€143,505,440
Cardiovascular Disease (€767/yr)	20.9%*	80,238	€126,962,213	€128,993,608	€131,025,004
Nephropathy (€355/yr)	19.5%*	74,863	€88,512,471	€89,928,670	€92,761,069
Neuropathy (€34/yr)	13.0%*	49,908	€44,757,937	€45,474,064	€46,190,191
PAD (€659/yr)	5.6%*	21,499	€32,717,244	€33,240,720	€33,764,196
Stroke (€68/yr)	6.3%*	24,186	€22,512,723	€22,872,927	€23,233,130
Diabetic Foot (€61/yr)	1.1%*	4,223	€4,538,909	€4,611,531	€4,684,154
Total Complicated Diabetes	**10.3%**	**387,115**	**€459,057,156**	**€466,402,069**	**€475,163,184**
TOTAL NATIONAL DIABETES BURDEN	**100.0%**	**3,758,400**	**€652,973,458**	**€663,421,032**	**€675,284,807**

9. VOLUME VS. COST PARADOX & 3-YEAR NATIONAL BUDGET TRAJECTORY (FIG. 3A & 3B)



Macroeconomic Takeaway (+1.6% Annual Growth): Algeria's adult diabetic population (14.4%) will expand from 3.76M (2024) to 3.88M (2026), with 2.21M prediabetics (8.2%). Complicated diabetes (10.3% of patients) drives €459.1M-€475.2M/yr (70.3% of total national cost).

10. CONCLUSIONS & POLICY RECOMMENDATIONS

✓ Substantial Economic Burden: Managing macro- and microvascular complications of diabetes imposes a massive financial strain on Algeria's healthcare system (>€475M/year by 2026).

✓ High-Cost Vascular Drivers: Cardiovascular disease (€767/pt) and PAD (€659/pt) nearly double baseline annual patient costs, while Retinopathy (€143.5M/yr) and CVD (€131.0M/yr) dominate national spending.

✓ **Prevention & Early Screening ROI: Strengthening primary glycemic control (€58/pt/yr), early vascular screening, and therapeutic education offers substantial budget savings.**

11. STUDY LIMITATIONS

• Registry Completeness: Incomplete medical charting for heterogeneous conditions (Diabetic Foot, Stroke, Neuropathy) precluded costing of acute surgeries, debridement, amputations, and inpatient stays.

• Literature Extrapolations: Proliferative retinopathy (PDR) & macular edema (DME) staging rates were derived from regional Algerian epidemiological literature (SADIAB 2019); dialysis share in nephropathy was unknown.

• Pricing Scope: Private-sector diagnostic pricing was used where public hospital accounting lacked unit tariffs; indirect productivity losses and inflation were excluded.

12. REFERENCES & AUTHOR CONTACT

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Corresponding Authors: Dr. Djenat DACI (djenat.daci@gmail.com)| Dr. Radia BENSEMMANE (r_bensemmane@yahoo.fr)

ABBREVIATIONS: ACEi: Angiotensin-Converting Enzyme Inhibitors • **ARB:** Angiotensin II Receptor Blockers • **BIA:** Budget Impact Analysis • **BP:** Blood Pressure • **CABG:** Coronary Artery Bypass Grafting • **CCB:** Calcium Channel Blockers • **DME:** Diabetic Macular Edema • **eGFR:** Estimated Glomerular Filtration Rate • **HbA1c:** Glycated Hemoglobin • **IDF:** International Diabetes Federation • **INN:** International Nonproprietary Name • **MI:** Myocardial Infarction • **MoH:** Ministry of Health • **OAD:** Oral Antidiabetic Drugs • **OCT:** Optical Coherence Tomography • **PAD:** Peripheral Artery Disease • **PDR:** Proliferative Diabetic Retinopathy • **ROI:** Return on Investment • **SmPC:** Summary of Product Characteristics • **TIA:** Transient Ischemic Attack • **UHC:** University Hospital Center • **UID:** Usual Initial Dose • **VEGF:** Vascular Endothelial Growth Factor • **WHO:** World Health Organization.