Health service utilization and adherence to medication for hypertension and diabetes among Syrian refugees and affected host communities in Lebanon

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Abstract

Methods This study uses data from a 2015 household survey of Syrian refugees and Lebanese host communities. A total of 1,376 refugee and 686 host community households were surveyed using a cluster design with probability proportional to size sampling. Differences in outcomes of interest by population group were examined using Pearson’s chi-square and t-test methods and the crude and adjusted odds of care-seeking and interrupted medication adherence among Syrian refugees were estimated using logistic regression.

Results Findings identified significant gaps between refugees and host community members in care-seeking, health facility utilization, out-of-pocket payments for care, and medication interruption. While host community members had better access to care and fewer reports of medication interruption compared to refugees, out-of-pocket spending for the most recent care visit was significantly higher among host community care-seekers. Refugee care-seekers most frequently received care at primary health facilities, choosing to do so mainly for reasons related to cost, whereas host community care-seekers predominantly utilized private clinics with greater concern for quality and continuity of care.

Conclusion Further efforts are needed to facilitate lower and more predictable health service costs for refugees and vulnerable host community members, as is continued communication on available subsidized care.

Purpose To characterize care-seeking, health service utilization and spending, and medication prescribing and adherence for hypertension and diabetes among Syrian refugees and host communities in Lebanon.

Keywords Syria · Lebanon · Refugee health · Health care utilization · Adherence

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Introduction

The influx of more than one million Syrian refugees since 2011 placed Lebanon as host to the highest number of refugees per capita worldwide [1, 2]. Contrary to the traditional model of providing refugee health care through a parallel system, refugee care is instead integrated into Lebanon’s existing health system [3–5]. The impact of this approach has been considerable strain on the country’s health system, particularly given the high prevalence of chronic non-communicable diseases (NCDs) in Lebanese and Syrian populations [6, 7].

At the time in which this survey was conducted (2015), care was available for vulnerable Lebanese for reduced costs at primary healthcare centers (PHCCs) in the Lebanese Ministry of Public Health’s (MoPH) National Network and Syrian refugees could utilize subsidized primary care (US$2–3) at 116 of over 1,200 existing PHCCs/dispensaries.
Medication for chronic conditions is also provided to refugees for US$0.67 at more than 400 facilities through the Young Men’s Christian Association (YMCA) chronic medications program [11, 12]. Refugees meeting eligibility criteria are also entitled to United Nations High Commissioner for Refugees (UNHCR) coverage of referral care; however, Lebanon’s highly privatized health system still often makes care for refugees as expensive as for Lebanese [7, 13, 14]. Alternative financing mechanisms such as a flat fee model including bundled services for a nominal predetermined fee are being explored, though are in pilot or early scale-up phases [15–17]. The burden of out-of-pocket payments can be sufficient to prevent many refugees and vulnerable Lebanese from receiving care. This barrier is substantial considering the increasing debt and strained financial situation of many refugee households [6, 7]. Despite wide coverage of subsidized care, 39% of Syrian refugees in Lebanon are reportedly not receiving needed care due to treatment and medication costs [18].

There is a paucity of research exploring care-seeking rates in the Lebanese population; previous studies focus primarily on treatment rates, often defined by use of antihypertensive or antidiabetic medication(s) [19]. Effective management of hypertension and type 2 diabetes often also require adherence to pharmacological intervention to mitigate poor health outcomes and increased long-term health costs [20–23]. The diversity of measures applied across studies hinders comparison of reported adherence rates and there is no established standard for ideal population-level adherence prevalence empirically associated with health outcomes [20, 24, 25]. The only identified estimate for Syrian refugees’ adherence to chronic disease medications was among beneficiaries in a 2018 evaluation of NCD services offered by Médecins Sans Frontières (MSF) in Irbid, Jordan, 89% of whom had high adherence, though non-adherence was much higher based on qualitative results [26].

This paper aims to fill these evidence gaps by providing empiric evidence on health service utilization, spending, and medication adherence for hypertension and diabetes by Syrian refugees and host communities in Lebanon.

**Methods**

**Data source**

A national survey of Syrian refugees and affected host communities in Lebanon was conducted in March and April 2015 to characterize health access and utilization. Survey methods presented here are abbreviated from detailed methods published elsewhere with main survey findings [27–30]. Detailed sample size calculation, sampling and questionnaire design, as well as survey implementation methods are available in the survey’s published technical report [27].

Sample size was determined for key objectives based on the most conservative prevalence estimate of 50% assuming 80% power and a design effect of 2.0. The planned sample was increased from a minimum of 900 refugee households to 1,400 refugee households and 700 host community households to improve precision. A 100-cluster x 21-household (14 Syrian refugee households and seven host community households) design was applied. Clusters were assigned to cadastrals using probability proportional to size (PPS) sampling with UNHCR registration data, assuming similar residence patterns in non-registered refugees. Permission could not be obtained to conduct the survey in 22 cadastrals, requiring PPS reassignment of 28 clusters. The final sample included 35 clusters in the North governorate, 34 in Bekaa, 25 in Mount Lebanon, four in Beirut, and two in the South (Fig. 1). Analyses exclude South governorate clusters due to violation of sampling assumptions. The final sample included 2,062 households (1,376 Syrian refugee and 686 Lebanese) for a response rate of 93.6%.

Cluster start points were randomly allocated to populated areas within cadastrals using ArcGIS. At the start point, interviewer pairs went in different directions to approach the nearest business or resident(s) for referral to nearby Syrian households. Upon interview completion, respondents were asked for referral to the nearest Syrian household; this referral process was used until 14 Syrian refugee interviews were completed. Following every two interviews with Syrian

![Fig. 1 Survey cluster assignment by governorate](image-url)
variables of interest included care-seeking and medication adherence. Care-seeking was assessed for household

Outcome variables of interest included care-seeking and medication adherence. Care-seeking was assessed for household

index cases of hypertension and diabetes based on questions about their most recent care visit for the condition. Care-seeking was analyzed binarily as whether the most recent visit was within the six months preceding interview. This time period reflects the distribution of care-seeking timing in the data and is the most conservative recommended follow-up interval for adults with elevated blood pressure per the 2017 ACC/AHA guidelines for blood pressure management [31]. Medication adherence was assessed binarily based on whether or not index cases reported stopping medication for two weeks or longer in the prior year. Explanatory variables included individual and household characteristics (Supplementary Tables 1 and 2).

Data analysis

Data were analyzed using Stata 13 (College Station, TX). Descriptive statistics and visual displays were examined to characterize missingness and distributions of variables to determine the analytical strategy’s appropriateness. Variance inflation factor scores for explanatory variables were all below 1.75, indicating no multicollinearity concerns relative to conventional thresholds. Differences in care utilization, spending, and medication use by population group were examined using Pearson’s chi-square and t-test methods. P-values and 95% confidence intervals were obtained accounting for cluster effects using the Rao and Scott second-order corrected Pearson statistic for dichotomous variables and adjusted F-statistics for continuous variables [32]. Given the fundamental differences between hypertension and diabetes and their potential effect on outcomes of interest, care-seeking and adherence were modeled separately for each condition.

Due to insufficient reports of interrupted medication adherence among Lebanese cases to support modeling (8.6% for hypertension; 8.5% for diabetes), regression analyses included only Syrian refugees. This also permitted inclusion of refugee-specific variables likely to be useful for program refinements.

The crude and adjusted odds of care-seeking and interrupted medication adherence were estimated using logistic regression. Interaction terms for key explanatory variables were recorded in toto and with sequential addition; however, Akaike and Bayesian Information Criterion indicated preference for the null model excluding all interaction terms.

Results

The final analyzed survey sample included 2,062 households (1,376 Syrian refugee and 686 Lebanese) for a response rate of 93.6%. An overview of household-level background characteristics among sampled households with at least member with hypertension and diabetes is provided in Supplementary
Table 3; greater background on the overall survey sample is also available in previous publications [27–30].

**Care-seeking and health service utilization**

**Hypertension**

Care-seeking for hypertension was high among both Syrian refugees and Lebanese host community members. Of 282 refugee hypertension index cases, most saw a doctor for hypertension in Lebanon (80.9%, CI: 75.2–85.5%), 64.5% (CI: 58.5–70.1%) did so in the preceding six months, and 51.4% (CI: 45.2–57.6%) within the past three months (Table 1). Similar to refugees, many Lebanese cases sought care for hypertension in the past six months (72.9%, CI: 66.1–78.7%) and 55.1% (CI: 48.4–61.6%) did so within the past three months.

Care-seeking location significantly differed between refugees and Lebanese (P<0.001). Most refugees receiving care for hypertension visited primary health facilities (54.9%), while over half of Lebanese hypertension care-seekers visited private clinics (59.2%), a significantly larger proportion than in refugees (21.5%) (P<0.001).

The most commonly reported reasons for selecting the most recent hypertension care location also differed between refugees and Lebanese (Table 1; Fig. 2; P<0.001). Refugees selected facilities primarily for cost-related reasons (65.6%) whereas only 17.9% of Lebanese care-seekers selected facilities for financial reasons, reflected in their higher utilization of private clinics. Lebanese care-seekers selected facilities largely for care quality/continuity (49%).

The primary reason for facility selection also significantly differed between refugee and Lebanese cases when stratified by facility type (primary health facilities and private clinics P<0.001) (Fig. 2), suggesting that population differences in reasons for selecting care locations are not entirely driven by underlying differences in facility types utilized. Cost was the most commonly reported motivation for both refugee (92.5%, CI: 85.6–96.3%) and Lebanese (60.5%, CI: 43.0–75.7%) primary health facility care-seekers. Only nominal proportions of refugee primary health facility care-seekers reported other motivations; larger proportions of Lebanese cited care quality/provider continuity (15.8%, CI: 7.7–29.6%) and location (15.8%, CI: 6.7–32.8%). Among hypertension care-seekers utilizing private clinics, quality/continuity was the leading motivation both for refugees (47.6%, CI: 32.0–63.7%) and Lebanese (69.0%, CI: 58.6–77.7%). Smaller proportions selected private clinics for location (refugees = 26.2%; Lebanese = 14.7%), and cost (refugees = 19.1%; Lebanese = 1.7%).

**Diabetes**

Care-seeking for diabetes was also high among Syrian refugees and host Lebanese. Among 136 diabetes index cases in refugee households, most received care for the condition in Lebanon (88.2%, CI: 81.8–92.6%). Many refugees sought care within the past six months (71.3%, CI: 63.6–78.0%) or in the past three months (61.8%, CI: 53.8–69.2%). Like refugees, most of the 144 Lebanese diabetes cases sought care in the past six months (82.6%, CI: 75.9–87.8%), and many within the past three months (66.0%, CI: 58.3–72.9%) (Table 1).

Diabetes care-seeking locations also significantly differed between by population group (P<0.001). More than half of refugees seeking diabetes care utilized primary health facilities (60.8%, CI: 50.7–70.1%) compared to only 17.5% (CI: 12.1–24.5%) of Lebanese, who most commonly utilized private clinics (59.5%, CI: 51.2–67.3% vs. 20.6%, CI: 13.7–29.7% of refugees) (Table 1). Like hypertension care, care-seeker characteristics were similar by facility type and sector for both populations.

Reasons for selecting diabetes care facilities were distributed similarly to those for hypertension with significant differences between refugees and host communities (Table 1; Fig. 2; P<0.001). Refugees most frequently selected facilities for financial reasons (78.4%, CI: 69.1–85.5%) and care quality/provider continuity was the leading motivation among Lebanese care-seekers (50.8%, CI: 42.1–59.4%).

Refugees and Lebanese still differed in the motivations that led them to seek diabetes care when stratified by the type of facility (primary facilities P<0.001; private clinics P=0.009) (Fig. 2). Refugee primary health facility care-seekers were predominantly motivated by cost (93.6%, CI: 83.7–97.6%) compared to only 50.0% (CI: 29.9–70.1%) of Lebanese. The remaining Lebanese primary facility care-seekers were motivated by perceived care quality/provider continuity (22.7%, CI: 9.6–44.8%) and location (27.3%, CI: 12.6–49.4%). Refugees seeking diabetes care at private clinics also did so largely because of cost (47.6%, CI: 26.7–69.4%), with smaller proportions driven by quality/continuity (23.8%, CI: 10.3–46.0%). Lebanese private clinic care-seekers were largely motivated by perceived quality/provider continuity (68.0%, CI: 55.1–78.6%).

**Predictors of care-seeking**

Table 2 presents results of univariate and multivariate logistic regression analyses of predictors of care-seeking for hypertension and diabetes in the preceding six months among Syrian Refugees. Adjusted odds of hypertension care-seeking were significantly associated only with region of residence; refugees in the North governorate had 1.94 times higher odds of care-seeking (CI: 1.01–3.73) than those in Beirut/Mount Lebanon (P=0.046). Refugees in the Bekaa had marginally...
significantly lower odds of diabetes care-seeking (0.35, CI: 0.12–1.01) compared to refugees in Beirut/Mount Lebanon (P = 0.053).

### Spending on health services

Self-reported care costs were collected for the most recent visit among cases who sought care for hypertension or diabetes in the preceding year. Costs included out-of-pocket payment(s) for consultation, diagnostics, and laboratory tests, but excluded those for medication or paid on the patient’s behalf. Out-of-pocket expenditures are summarized in Fig. 3 and Supplementary Table 4. Costs reflect expenditures reported by care-seekers at PHCCs in MoPH and Ministry of Social Affairs (MoSA) facilities and those operated privately or by non-governmental organizations (NGOs); differentiation of costs between facilities within and outside the MoPH-PHCC network was not possible.

#### Hypertension

Overall, 66.7% (CI: 59.2–73.4%) of refugee and 77.0% (CI: 70.7–82.3%) of host Lebanese hypertension cases reported out-of-pocket payments (Fig. 3; P = 0.017). Average out-of-pocket costs were US$14.4 (CI: 9.8–18.9) for refugees and US$29.5 (CI: 24.8–34.2) for Lebanese (P < 0.001). Average

### Table 1 Care-seeking for hypertension and diabetes

|                     | Hypertension                              | Diabetes                              |
|---------------------|-------------------------------------------|---------------------------------------|
|                     | Syrian Refugees | Host Community | Syrian Refugees | Host Community |
|                     | % (95% CI)     | % (95% CI)     | % (95% CI)     | % (95% CI)     |
| Last time care sought<sup>a</sup> |                           |                           |                           |                           |
| < 1 month ago       | 26.2 (21.3–31.9) | 25.0 (20.1–30.6) | 33.1 (25.2–42.1) | 25.7 (19.0–33.7) |
| 1–2 months ago      | 25.2 (20.4–30.7) | 30.1 (24.8–35.9) | 28.7 (21.7–36.9) | 40.3 (32.7–48.4) |
| 3–6 months ago      | 13.1 (9.4–18.0)  | 17.8 (13.5–23.1) | 9.6 (5.8–15.3)  | 16.7 (11.2–24.0) |
| 7 months – 1 year ago | 4.6 (2.6–8.0)  | 10.2 (6.9–14.7) | 3.7 (1.5–8.5)  | 4.9 (2.4–9.6)  |
| > 1 year ago        | 11.7 (8.1–16.6) | 15.3 (10.9–20.9) | 13.2 (8.7–19.6) | 9.7 (5.7–16.0)  |
| Never sought in Lebanon | 18.4 (13.8–24.2) | 0.4 (0.1–3.0) | 10.3 (6.2–16.6) | 0.7 (0.1–4.9) |
| <sup>b</sup>P-value | <0.001          |                           | <0.001          |                           |
| Saw a doctor in Lebanon<sup>c</sup> | 80.9 (75.2–85.5) | 98.3 (95.6–99.4) | 88.2 (81.8–92.6) | 97.2 (92.9–98.9) |
| <sup>b</sup>P-value | <0.001          |                           | 0.005           |                           |
| Most recent care location<sup>c</sup> |                           |                           |                           |                           |
| Primary level facility | 54.9 (47.6–61.9) | 19.4 (14.3–25.7) | 60.8 (50.7–70.1) | 17.5 (12.1–24.5) |
| Private clinic       | 21.5 (16.6–27.5) | 59.2 (51.0–66.9) | 20.6 (13.7–29.7) | 59.5 (51.2–67.3) |
| Hospital             | 8.2 (5.1–12.9)  | 15.8 (11.4–21.6) | 3.9 (1.5–9.9)  | 15.9 (10.7–22.8) |
| Pharmacy             | 9.2 (5.6–14.8)  | 2.6 (1.0–6.1) | 9.8 (5.5–16.8) | 6.3 (3.3–12.0)  |
| Other                | 6.2 (3.0–12.3)  | 3.1 (1.2–7.5) | 4.9 (2.1–11.1) | 0.8 (0.1–5.6)  |
| <sup>b</sup>P-value | <0.001          |                           | <0.001          |                           |
| Reason for selecting location<sup>c</sup> |                           |                           |                           |                           |
| Low cost consultation | 48.2 (40.5–56.0) | 11.2 (7.6–16.3) | 59.8 (50.0–68.9) | 13.5 (8.1–21.5) |
| Free consultation    | 17.4 (13.0–22.9) | 6.6 (3.8–11.3) | 18.6 (12.4–27.0) | 7.1 (3.8–12.9) |
| Like quality/family doctor | 13.8 (9.4–19.9) | 49.0 (40.8–57.2) | 7.8 (4.1–14.6) | 50.8 (42.1–59.4) |
| Closest to residence | 12.8 (8.5–18.8) | 15.3 (10.4–21.9) | 9.8 (5.4–17.1) | 16.7 (10.8–24.8) |
| Availability of services | 2.1 (0.8–5.3) | 11.2 (7.1–17.3) | 2.0 (0.5–7.6) | 7.9 (4.0–15.2) |
| Medical emergency    | 2.6 (1.1–6.1)  | 4.6 (2.3–9.1) | 1.0 (0.1–6.8) | 2.4 (0.8–7.2)  |
| Other                | 3.1 (1.0–9.2)  | 2.0 (0.8–5.3) | 1.0 (0.1–6.9) | 1.6 (0.4–6.3) |
| <sup>b</sup>P-value | <0.001          |                           | <0.001          |                           |

<sup>a</sup> As percent of household index cases reporting hypertension or diabetes diagnosis

<sup>b</sup> Group comparison using Pearson’s chi-square for proportions. Statistical significance indicated in bold (P < 0.05) and bold italics (P < 0.001).

<sup>c</sup> As percent of household index cases receiving care in Lebanon for the condition in the year prior to interview
costs among those incurring any were US$21.7 (CI: 14.9–28.5) for refugees and US$38.4 (CI: 33.3–43.5) for Lebanese ($P < 0.001$). Significant differences in hypertension care costs by facility type were observed for refugee ($P = 0.001$) and Lebanese care-seekers ($P < 0.001$); for both populations, the highest costs were at hospitals (US$81.4, CI: 29.5–133.2 for refugees; US$69.8, CI: 47.1–92.4 for Lebanese) and the lowest at primary health facilities (US$10.0, CI: 4.6–15.4 for refugees; US$21.7, CI: 12.1–31.2 for Lebanese).

**Diabetes**

Out-of-pocket payments for diabetes care were reported by 70.6% (CI: 62.3–77.7%) of refugee and 82.5% (CI: 74.5–88.4%) of Lebanese cases ($P = 0.025$). Average out-of-pocket costs were US$12.0 (CI: 8.2–15.7) among refugees and US$31.6 (95% CI 26.7–36.5) among Lebanese ($P < 0.001$). Among those reporting care costs, average amounts were significantly lower for refugees (US$17.1, CI: 12.0–22.2) compared to Lebanese (US$38.7, CI: 33.3–44.0) ($P < 0.001$).

The cost of diabetes care for both refugees and Lebanese was highest at private clinics (US$26.9, CI: 19.7–34.1 for refugees; US$44.2, CI: 38.2–50.2 for Lebanese), significantly greater than at primary level facilities (US$13.5, CI: US$6.8–20.1 for refugees; US$16.5, CI: 9.0–24.0 for Lebanese) (refugee $P = 0.010$; Lebanese $P = 0.015$). Only two refugee cases reported cost amounts for hospital care (both of whom paid US$6.6, presumably reflecting financial support from UNHCR or another organization), barring reliable hypothesis.
testing. Significant differences in costs between refugees and Lebanese were seen only at private clinics, where average costs were US$26.9 (CI: 19.7–34.1) among refugee and US$44.2 (CI: 38.2–50.2) among Lebanese care-seekers (P = 0.001).

Medication prescription and current use

Summaries of medication prescription and interrupted use among index cases of hypertension and diabetes are presented in Table 3.

Hypertension

Among refugee hypertension cases, 97.2% (CI: 94.4–98.6) were prescribed medication for the condition. Many cases reported currently taking hypertension medication (79.4%, CI: 74.4–83.6); however, 27.8% (CI: 22.3–34.1) reported stopping their medication for two weeks or longer in the preceding year without physician instruction. The most common reason refugees stopped hypertension medication was inability to afford the medicine (77.8%, CI: 68.2–85.1).

Diabetes

Nearly all (98.5%, CI: 94.2–99.6) refugee diabetes cases were prescribed medication and most (89.7%, CI: 83.0–93.9) reported currently taking oral hypoglycemic drugs and/or insulin. Of all refugee diabetes cases, 25.0% (CI: 18.4–33.0) reported stopping medication for two weeks or longer in the preceding year without a physician’s instruction to do so. Cost remained the most common reason for stopping diabetes medication (76.5%, CI: 57.8–88.5).
Almost all (97.2%, CI: 92.9–98.9) Lebanese diabetes cases were prescribed medication for the condition and most (95.1%, CI: 90.4–97.6) were currently taking medication. Of all Lebanese diabetes cases, 8.5% (CI: 4.9–14.3) of all cases stopped medication without physician instruction. Again, the most common reason for stopping medication without physician instruction was cost (91.7%, CI: 57.8–98.9); however, unlike with hypertension 25.0% (CI: 9.5–51.3) of diabetes cases who interrupted medication use did so per physician instruction. Significant differences between refugees and host community members with diabetes were observed in stopping medication (any stopping \( P = 0.002 \); stopping without physician instruction \( P < 0.001 \), with refugees having lower adherence than Lebanese.

**Predictors of interrupted medication adherence**

Results of univariate and multivariate logistic regression analyses for predictors of interrupted medication adherence among Syrian refugees are presented in Table 4. Adjusted odds of interrupted adherence to hypertension medication were significantly associated only with having seen a health provider in the preceding three months, which was protective (OR = 0.58, CI: 0.34–0.99) compared to those who did not receive care in that period (\( P = 0.046 \)). Adjusted odds of interrupted adherence to medication for diabetes were significantly associated only with monthly household expenditures. Being in a household with above median expenditures was protective against medication interruption (OR = 0.35; CI:
0.14–0.91) compared to households reporting below median expenditures ($P = 0.031$).

**Discussion**

In the sparsely reported empiric literature on Syrian refugee care-seeking and medication adherence for chronic conditions, findings from this study provide novel population level evidence for practical decisions as Lebanon advances its policies of inclusion and equity in integrating Syrian refugee care into the existing health system. The influx of Syrian refugees into Lebanon since 2011 has strained health system capacity to provide medical care and essential medicines to refugees and host communities alike. This paper presents evidence of significant gaps in health care seeking, utilization, and medication adherence for hypertension and diabetes between Syrian refugees and host communities in Lebanon. These activities are interconnected and potentially influenced by facility type and location, cost relative to a household’s ability to pay, perceived care quality, and medical need. While host community members had better access to care and fewer reports of medication interruption compared to refugees, out-of-pocket spending for the most recent care visit was significantly higher among host community care-seekers. Refugee care-seekers most frequently received care at primary health facilities, choosing to do so mainly for reasons related to cost.

| Table 3: Medication use for hypertension and diabetes |
|------------------------------------------------------|
| **Hypertension** | Syrian Refugee | Host Community | **Diabetes** | Syrian Refugee | Host Community |
| Ever prescribed medication for condition | 97.2 (94.4–98.6) | 99.2 (96.6–99.8) | 98.5 (94.2–99.6) | 97.2 (92.9–98.9) |
| $P$-value | 0.072 | | | | 0.453 |
| Country where prescribed | (n = 274) | (n = 134) | | | |
| Syria | 40.1 (33.0–47.7) | --- | 33.6 (26.4–41.7) | --- | |
| Lebanon | 59.9 (52.3–67.0) | --- | 66.4 (58.3–73.6) | --- | |
| Currently taking medication | 79.4 (74.4–83.6) | 95.8 (91.9–97.8) | 89.7 (83.0–93.9) | 95.1 (90.4–97.6) |
| $P$-value | $< 0.001$ | | | | 0.080 |
| Interrupted Medication Adherence | (n = 259) | (n = 133) | (n = 140) | (n = 140) |
| Stopped medication for > 2 weeks in past year | 30.5 (24.8–36.9) | 9.0 (6.0–13.3) | 26.3 (19.5–34.6) | 11.4 (7.2–17.7) |
| $P$-value | $< 0.001$ | | | | 0.002 |
| Stopped medication for > 2 weeks in past year without physician instruction to do so | 27.8 (22.3–34.1) | 8.6 (5.7–12.8) | 25.0 (18.4–33.0) | 8.5 (4.9–14.3) |
| $P$-value | $< 0.001$ | | $< 0.001$ | |
| Where medication was stopped | (n = 72) | (n = 34) | (n = 12) | (n = 12) |
| Syria | 11.1 (5.0–23.0) | --- | 11.8 (4.6–27.0) | --- | |
| Lebanon | 88.9 (77.0–95.0) | --- | 88.2 (73.0–95.4) | --- | |
| Reason for stopping medication | (n = 72) | (n = 20) | (n = 34) | (n = 12) |
| Household could not afford | 77.8 (68.2–85.1) | 75.0 (51.3–89.5) | 76.5 (57.8–88.5) | 91.7 (57.8–98.9) |
| Symptoms improved/felt better | 6.9 (3.1–15.0) | 10.0 (2.4–33.1) | 8.8 (3.1–22.7) | 8.3 (1.1–42.2) |
| Did not know where to get it | 5.6 (2.1–13.9) | 5.0 (0.7–29.1) | 0.0 -- | 0.0 -- | |
| Did not like available meds | 1.4 (0.2–9.4) | 10.0 (2.4–33.1) | 0.0 -- | 0.0 -- | |
| Not available | 2.8 (0.7–9.9) | 0.0 -- | 5.9 (1.4–21.4) | 0.0 -- | |
| Other | 5.6 (2.1–13.9) | 0.0 -- | 8.8 (2.9–24.2) | 0.0 -- | |
| $P$-value | 0.348 | | 0.559 | |

$a$ Group comparison using Pearson’s chi-square for proportions. Statistical significance indicated in bold ($P < 0.05$) and bold italics ($P < 0.001$).

$b$ As percent of household index cases diagnosed with hypertension/diabetes

$c$ As percent of refugee index cases who stopped taking medication for > 2 weeks in past year without physician instruction

$d$ As percent of all household index cases who stopped taking medication for > 2 weeks in past year
whereas host community care-seekers predominantly utilized private clinics with greater concern for quality and continuity of care.

**Care-seeking and utilization**

Continuous, quality care is essential to effectively managing diabetes and hypertension. As patients experience the two conditions differently, their motivations can be influenced by the silent nature of hypertension versus symptomatic diabetes. Differential prioritization of cost and perceived care quality/provider continuity by refugees and Lebanese suggest the further impact of contextual factors on care-seeking behavior.

Care-seeking for hypertension and diabetes in Lebanon diverged between refugees and Lebanese. Lebanese cases were more likely to seek care than were refugees, and to have done so within the past six months. Although care-seeking is high in both populations, individuals not regularly seeking care for these conditions can experience adverse clinical events that routine care might avoid [33].

Refugee hypertension care-seekers differ from Lebanese in the weight they give to the importance of facility type, cost, quality, and continuity. As refugees most often sought care in primary level facilities, it is not surprising that cost predominately motivated their treatment decisions. Lebanese cases’ concern with care quality, determined by prior care or therapeutic relationships, is consistent with their greater use of private clinics.

Refugees’ private clinic care-seeking for cost-related reasons may reflect previously documented misunderstanding about relative costs at primary facilities versus private clinics. Alternatively, they may mistakenly believe that the selected facility provided reduced-cost care [33, 34]. During survey implementation, many respondents could not reliably classify the health facility type they most frequently visited. Respondents generally classified PHCCs in the MoPH network and those supported by UNHCR/NGOs as the same, hence their inclusion as a single response option in the final questionnaire. Difficulty identifying facility types may also have extended to misclassifying private clinics and suggests telling evidence of many refugees’ vague understanding of available support. This knowledge gap is consistent with refugee knowledge of available services reported in UNHCR’s annual Health Access and Utilization Survey (HAUS), which found that in 2014 (the most comparable to the present survey’s timing), only 54% of Syrian refugees knew they should pay US$2–3 for consultation at PHCCs [35]. While this has improved, the gap in awareness persists with only 60% of refugees aware of payment amounts in 2018’s HAUS [36]. Refugee knowledge that chronic medication is available for a maximum of US$0.66 was much lower, observed in 1% of refugees 2013 and 23.8% in 2014 [35].

In addition to distributing health brochures with information on how to access health care in Lebanon, UNHCR has also increased communication to refugees through numerous other channels [4, 37, 38]. UNHCR has reported improvement in refugees’ knowledge of health services and costs since 2013; however, many Syrian refugees remain unaware of available services or healthcare costs. The HAUS and similar studies have consistently reported cost as the prime barrier to refugee care-seeking in Lebanon [35, 36, 39]. Limited or incorrect understanding of healthcare costs may further the influence of inability to afford care on care-seeking.

**Spending on health services**

Although this work primarily aimed to assess utilization, cost is a central consideration given its role as a primary barrier to care-seeking. The proportion of refugees reporting out-of-pocket payments and their amounts were lower than among Lebanese for both hypertension and diabetes, suggesting that current humanitarian programming may be contributing to maintaining refugee access to NCD care for those aware of subsidized services. The majority of all care-seekers reported some out-of-pocket payments, with an overall lower median cost for Syrian refugees (US$3 for hypertension, US$5 for diabetes) than Lebanese care-seekers (US$33 for both conditions). This difference is likely due to subsidized care at many primary level facilities more commonly utilized by refugees. Payments were reported by a larger proportion of Lebanese care-seekers, consistent with their higher overall costs and use of private clinics. Lebanese care-seekers in this sample reflect those from communities among the most vulnerable and affected by the refugee influx. Such disproportionally higher costs among host communities thus raises concerns about their continued ability to afford needed care.

Among hypertension and diabetes refugee cases, 74% and 72% respectively reported all members currently being registered with UNHCR; 12% in both groups reported some members registered. Median reported consultation costs (US$5 for hypertension, US$7 for diabetes) among refugees reporting any payment at primary health facilities exceed the standard subsidized rate (US$2–3). Only 47% of hypertension care-seekers and 42% of diabetes care-seekers reported paying US$3 or less at primary level facilities, suggesting care-seeking outside facilities providing subsidized services.

Respondents may also have included medication or laboratory testing with consultation costs, resulting in a broader range of payment amounts. Although out-of-pocket costs for consultation and medication for chronic conditions are offered for flat fees, UNHCR proportionally covers 85% of laboratory testing costs with refugees incurring the remaining 15% [5]. In Lebanon’s privatized system, testing costs are often unpredictable and can reach unaffordable amounts. Diagnostic costs are subsidized only for designated groups, such as adults 60 years
and older (among others) [5]. Within Lebanon’s pluralistic and fragmented health system, base costs for testing vary considerably across facilities, potentially contributing to individuals not seeking needed care. Instances of delaying or avoiding care-seeking may be prevented through bundled services provided at set costs communicated in advance of care.

The Emergency Primary Healthcare Restoration Project (EPHRP) and the Reducing Economic Barriers to Accessing Health Services (REBAHS) project seek to address the inconsistency and unpredictability of financial barriers to care among refugees and host communities in Lebanon. The World Bank and Lebanese MoPH began the EPHRP in 2016 to “restore access to essential healthcare services for poor Lebanese affected by the influx of Syrian refugees” [16]. Through the end of 2019, the EPHRP piloted an essential health care package for 150,000 limited-income Lebanese in the MoPH network of PHCCs and hospitals. The NCD service package consists of five doctor’s visits per year, annual electrocardiogram, lab tests, foot exam, counseling, and medications provided free of charge to enrolled beneficiaries with diabetes and hypertension [17]. By December 2018, over 120,000 patients were enrolled in the project, with 101,454 users, of which 14% received care for diabetes and 20% for hypertension [40].

The REBAHS project began in 2018 led by a consortium of international NGOs (INGOs) to reduce the burden of healthcare costs on “crisis-affected populations” in Lebanon [15]. Like the EPHRP, REBAHS provides support to select PHCCs through subsidized services based on a flat fee model requiring US$2 out-of-pocket patient payment for consultation; remaining visit costs are covered by supporting INGOs. These projects are in early phases and evidence of their impact is not yet available; however, early reports suggest that they are promising models for reforming health financing to facilitate healthcare access for those most in need. Financial support through these projects enables regular, predictable costs to beneficiaries, lessening the potential for devastating expenditures on individuals requiring continuous care. A substantial

| Hypertension | Crude OR | Adjusted OR |
|--------------|----------|-------------|
| Any hypertension care in past 3 months | 0.59 (0.35-1.00) | 0.58 (0.34-0.99) |
| Region of residence (ref: Beirut/Mt. Lebanon) | | |
| Bekaa | 1.04 (0.50-2.15) | 1.00 (0.45-2.20) |
| North | 1.03 (0.48-2.24) | 1.06 (0.47-2.37) |
| Female-headed HH | 1.39 (0.67-2.88) | 1.30 (0.58-2.89) |
| HH head completed ≥ primary education | 0.73 (0.38-1.40) | 0.77 (0.38-1.56) |
| Above median monthly HH expendituresa | 0.86 (0.49-1.52) | 0.94 (0.53-1.66) |
| Arrived in Lebanon 2013–2015 (ref: 2011–2012) | 1.11 (0.66-1.87) | 1.09 (0.65-1.83) |
| Receipt of cash and/or voucher assistanceb | 1.26 (0.61-2.59) | 1.28 (0.61-2.71) |
| Diabetes | | |
| Any diabetes care in past 3 months | 0.72 (0.30-1.74) | 0.81 (0.32-2.07) |
| Region of residence (ref: Beirut/Mt. Lebanon) | | |
| Bekaa | 0.62 (0.22-1.79) | 0.46 (0.14-1.55) |
| North | 0.66 (0.27-1.59) | 0.62 (0.25-1.56) |
| Female-headed HH | 0.58 (0.18-1.88) | 0.71 (0.22-2.33) |
| HH head completed ≥ primary education | 2.52 (0.65-9.72) | 2.29 (0.60-8.70) |
| Above median monthly HH expendituresa | 0.43 (0.17-1.10) | 0.35 (0.14-0.91) |
| Arrived in Lebanon 2013–2015 (ref: 2011–2012) | 1.00 (0.41-2.44) | 0.93 (0.36-2.35) |
| Receipt of cash and/or voucher assistanceb | 1.60 (0.60-4.26) | 1.85 (0.59-5.82) |

HH = household. Statistical significance indicated in bold (P < 0.05) and bold italics (P < 0.001).

Interrupted medication adherence is defined as having stopped medication for hypertension/diabetes for two weeks or longer in the preceding year without physician instruction

a Relative to median monthly household expenditures reported by Syrian refugees

b Includes cash or voucher assistance received from a United Nations agency, NGO, or other religious or community group in the month preceding interview.

Table 4 Estimated odds of interrupted medication adherence among Syrian refugees
increase in demand at participating PHCCs is already apparent; EPHRP monitoring indicated an 88% increase in Lebanese utilization of PHCCs from 2015 to 2017, and a pilot preceding REBAHS reported a 41% increase in care-seekers following flat fee model implementation [15, 41, 42]. Such subsidies should continue to be explored and evidence of their impact documented alongside plans to scale up both projects.

Facility-level support interventions are another essential component for such projects’ sustainability. Beyond financial coverage of patient care, these projects reinforce the health system and facilitate improved care through capacity building for enhanced service quality, supply chain management, and in-kind buffer stocks of medicines [8, 15–17]. Facilities’ ability to meet increased demands while maintaining care quality relies on support and further funding for increased staffing, maintenance, and operations.

Improving refugee access to affordable healthcare without addressing existing barriers faced by many Lebanese risks furthering interpopulation tensions [43]. Continuation of projects like EPHRP and REBAHS may address both immediate patient needs and development-oriented goals of strengthening Lebanon’s health system, presenting an opportunity for equitable healthcare access previously not realized for all Lebanese; however, stronger evidence of the projects’ impacts are needed to determine their feasibility and effectiveness as alternative models [42].

**Medication prescription and adherence**

Nearly all hypertension and diabetes cases in this survey were currently taking medication for their condition, though significantly fewer refugees reported current medication use for hypertension compared to Lebanese. Consequently, medication interruption was significantly higher among refugees than Lebanese, yet surprisingly similar between hypertension and diabetes. For both conditions, medication interruption was reported by over one-quarter of refugees, more than three times as high as interruption reported by Lebanese.

Cost was the primary reason for medication interruption in both population groups and conditions, confirming financial burden’s role in health decision-making. As with care-seeking, gaps in knowledge about free or low-cost medication may be leading to diversion from prescribed treatment regimens and dosage, or even to foregoing medication altogether when individuals may otherwise adhere to prescribed treatment if they were aware of subsidized options. In 2014, only 23.8% of refugees knew that chronic medication prescriptions could be filled for a maximum of US$0.67; however, more recent data are not available [35]. Reported stock-outs or inconsistent availability of medications may also necessitate obtaining medication at private pharmacies where reduced-cost medication is not guaranteed, suggesting an opportunity for intervention to enhance inventory management and drug availability where financial support is provided.

Though care utilization was not significantly associated with interrupted medication adherence for diabetes in our survey, receiving care in the preceding three months was associated with lower odds of medication interruption for hypertension. The discordance in this association could arise from the conditions’ pathological differences. Diabetes often presents symptoms that interfere with patients’ day-to-day lives, serving as both a reminder and possible motivator for consistent care and treatment compliance. Conversely, hypertension is mostly asymptomatic; in the absence of conspicuous symptoms, health provider visits may serve as a reminder or motivation for treatment compliance. Better management of both conditions may be achieved by promoting regular care.

**Limitations**

Reliance on UNHCR registration data for sample design and allocation may have introduced sampling bias if registered and unregistered refugees have different geographic distributions. Access restriction necessitated exclusion of large areas of the country; the survey coverage area included only 53% of registered refugees so is not representative of the entire Syrian refugee population. The 2:1 ratio of refugee to host community households was also limiting in instances of rare occurrences. The host community sample was obtained using a neighborhood sampling approach, so reflects communities hosting the largest number of refugees, likely to have lower economic status and different geographic distribution than the broader Lebanese population, hindering generalizability. Within cluster referrals also present a potential for bias; however, households were referred by different respondents and small cluster sizes aimed to attenuate within-cluster similarities and associated design effects.

Respondents’ inability to accurately distinguish between facilities providing primary care is another limitation. The complex assortment of primary facilities in Lebanon includes those in the MoPH network, operated by MoSA and local organizations, supported by humanitarian NGOs, and a well-established number of private clinics. A single facility may fall into more than one of these categories, complicating classification for brief household surveys. Despite efforts to develop suitable response categories for primary care facilities, more specific classification lacked adequate reliability so was excluded from the final questionnaire. This survey is not able to differentiate between care-seeking and costs at PHCCs in the MoPH network and other primary level facilities. As such, results are not intended to indicate whether primary health facilities are in the MoPH network or operated/supported by NGOs, MoSA, or private entities.

Additional limitations include the use of self-report for key outcome measures as over-reporting care-seeking and
medication adherence is likely increased due to social desirability and recall biases. Moreover, the single question medication adherence measure captures medication underuse but not explicitly other manners of non-compliance. Finally, the skewed distribution of key variables and notably high overall reporting of medication adherence hinders detection of weaker associations.

Conclusions

This study provides empiric information regarding refugee and host community behaviors for managing hypertension and diabetes. Findings demonstrate significant disparities between these populations in care-seeking, health facility utilization, out-of-pocket payments, and medication interruption. Results show greater access to care, preference for private clinics, and fewer reports of medication interruption in host Lebanese cases. Out-of-pocket spending, however, was significantly higher in Lebanese cases than among refugees, reflecting differential financial support and, potentially, means for affording care. Results also show differences in motivation for selecting treatment locations, with Lebanese cases demonstrating more concern for quality of care and provider continuity while refugees were more cost-sensitive.

The goal of sustainable, high-quality medical care is the same for refugees and host communities in Lebanon. Continuing and new challenges in Lebanon, including COVID-19 and the ongoing economic crisis, necessitate consideration in different domains of health policy, funding models, capacity building, and resource mobilization for sustainable and equitable solutions towards health access for refugees and host communities alike. New models such as flat fee structures may be effective means for achieving this goal and for closing gaps between need and care-seeking practices. Based on the present research, additional efforts are needed to facilitate minimal and predictable out-of-pocket costs for health services and to ensure awareness of subsidized care for refugees and vulnerable Lebanese.

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Authors’ contributions All authors participated and approved the paper prior to submission. EL led survey implementation, data collection, data analysis, and preparation of the manuscript. LC participated in the study design, helped to refine data-collection tools, and assisted in managing data collection; The LHAS study team members played key roles in the planning, implementation, and management of the study. SD was the principal investigator, led the study design with GB, and advised on implementation and data analysis. GB, PS, LM, and SD contributed to preparation of the manuscript and participated in critical review.

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Data Availability The dataset supporting the conclusions of this article is available in the Humanitarian Data Exchange and can be accessed at: https://data.humdata.org/dataset/ht-dm-care-and-medication-in-lebanon.

Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethics approval The study was approved by the Institutional Review Board at the American University of Beirut. The Johns Hopkins University Bloomberg School of Public Health Institutional Review Board also reviewed the protocol and determined that members of the JHSPH research team were not involved in human subjects research because they did not have direct contact with participants or access to personal identifiers.

Consent to participate Interviewers obtained verbal informed consent from all participants by reading a consent form in Arabic outlining the purpose of the assessment, intended use of results, confidentiality, and the voluntary nature of participation. Potential respondents were informed that no identifying information would be recorded on the survey instrument or reported and that they had the right to decline to participate, stop the interview at any time, or to decline to answer any question.

Consent for publication Not applicable.

Code availability Not applicable.

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