





participants would provide sufficient power to detect the proportion of fully immunized children. To account for incomplete responses of 20%, we set the target sample size at 480.”

Due to the unequal distribution of Syrian refugees across different regions in Lebanon, we employed a stratified sampling technique. We determined the sample size for each governorate based on the proportion of the refugee population residing in that region, ensuring representation across Beirut, Bekaa, South Lebanon, and North Lebanon. This proportional allocation allowed us to reflect the regional diversity within the Syrian refugee population in our sample. According to UNHCR, a total of 976,000 Syrian refugees were present in Lebanon up till 31 July 2018. The distributions according to regions were as follows: 254,993 in Beirut, 351,972 in Bekaa, 117,500 in South and 251,537 in North Lebanon [7]. Thus, a total of 126 participants were included from Beirut, 175 from Bekaa, 58 from South and 125 from North Lebanon.

**Table 1** Association between sociodemographic characteristics and immunization status

Characteristics	<i>N</i>	% Of Fully Immunized Children	<i>P</i> -value
<i>Age of mother</i>			
Mean ± SD	26.73 ± 5.97		

During the interview, the mothers were asked to present their child’s vaccination card, if accessible, for the assessment of their immunization status. For mothers who did not have the vaccination card at the time of the interview, we asked about each vaccine their child received and documented completeness based on their responses. Among the participants, 226 mothers had the vaccination card during the interview, 232 reported having it at home, and 24 did not possess a vaccination card at all.

To ensure accuracy, we compared the proportion of fully immunized children between those who had a vaccination card present and those who did not. We found no significant difference in immunization rates between these groups. Additionally, the associations between immunization completion rates and sociodemographic variables remained consistent, regardless of whether a vaccination card was available.

#### Statistical analysis

SPSS 23 was used for analysis. For descriptive purposes, continuous variables were displayed as means ± standard deviations. Categorical variables were presented as numbers and percentages. A chi-square test for independence was employed to evaluate the associations between categorical variables, including sociodemographic characteristics and immunization status.

## Results

### Sample characteristics and immunization status

A total of 484 Syrian refugee mothers participated in this study. Among these, 51.4% reported that their children were fully immunized according to their age. The age of the interviewed Syrian refugee mothers ranged from 15 to 47 years (mean age of 26.73 ± 5.97 years). Regarding the educational level, the highest percentage recorded (31%) was for mothers reaching secondary school. The majority of the participants were unemployed (90.9%). Neither education nor employment status was associated with vaccination status of the respective children.

The residency of the mother was significantly associated with the child immunization status (*p*-value = 0.002) in a way where those who lived in an apartment/house had the highest percentage of children vaccinated (64.3%). As for the regions in which the Syrian refugees were distributed, those who resided in Beirut had the highest percentage for children who were fully immunized (63.5%), with a significance of 0.019. The age of children of interviewed mothers ranged from 1 to 58 months (mean age of 20.23 ± 15 months). Other characteristics regarding the demographics of the sampled mothers are recorded in Table 1.

### Knowledge of childhood immunizations

As shown in Table 2, most respondents (79.8%) stated that the purpose of vaccination was the prevention of vaccine-preventable diseases but also many (73.3%) thought that vaccines can prevent non-communicable diseases as well. Over half of the participants (54.8%) interviewed thought that vaccines actually treat diseases. As for diseases that could be prevented by vaccination, polio and measles recorded the highest percentages with 85.5% and 87.2%, respectively. It was also noted that hepatitis B recorded the highest percentage (74.9%) for a fatal disease that was believed to necessitate vaccination. Around 23% of mothers had the perception of diabetes mellitus being one of the vaccine preventable diseases. There is no statistically significant difference between mothers of immunized and never-immunized children when it comes to knowledge regarding purpose of vaccination.

The majority of the mothers considered vaccinations

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<b>Characteristics</b>	<b>N (%)</b>
<i>Perception of their immunization knowledge</i>	
Good	282 (58.3)
Fair	174 (36.0)
Poor	28 (5.8)
<i>Purpose of vaccination</i>	

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( $p < 0.001$ ) all played a significant role and match up with the information we have from previous studies [6, 9, 16]. In our study, infants up to 6 months of age had more adequate patterns of vaccinations compared to older children between 6 months and 5 years of age, coinciding with literature [9].

Approximately 48.6% of the children in our study exhibited aberrant vaccination patterns, indicating either partial or complete lack of immunization, whereas data collected in 2015 showed that 79.9% of Syrian refugee children in Lebanon had incomplete vaccination [20]. Wide efforts have been made by the Lebanese MOPH in collaboration with UNICEF and WHO within this timeline to reduce the occurrence of vaccine-preventable diseases to the least possible by ensuring timely and complete access to vaccination for the entire population, focusing on the most vulnerable [21]. The difference in data between this study and data in 2015 presumes the successful contribution of these interventions in the improvement of vaccinations rates, even amidst several national health and economic crises. Despite minor knowledge gaps among refugee mothers, targeting health education, raising awareness among healthcare workers about their vital role, improving provider communication, and providing Arabic informational materials may



