“Banking soundness-financial stability nexus: empirical evidence from Jordan”

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BANKING SOUNDNESS-FINANCIAL STABILITY NEXUS: EMPIRICAL EVIDENCE FROM JORDAN

Abstract

The main purpose of this study is to investigate the relationship between financial stability and banking soundness in Jordan. For this purpose, the study mainly uses the FMOLS approach in addition to other analysis techniques and tools. The outcomes of the descriptive analysis show that the Jordanian financial system seems stable, and the indicators of banking soundness signal a steady and solid banking sector. The empirical results reveal that the majority of the banking soundness indicators have a positive impact on financial stability. This asserts that a sound banking sector plays a vital role in maintaining a stable financial system. However, the findings also indicate that a steady interest rate policy is one of the significant requirements for sustaining the stability of financial systems. Moreover, the response of financial stability with respect to economic growth changes is found to be positive and relatively high. On the fact of the importance of the topic under study, since financial stability is one of the major concerns of the authority bodies, the empirical findings can have very important policy implications for decision-makers.

Keywords financial stability, banking soundness, FMOLS approach, cointegration tests, Jordan

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INTRODUCTION

In general, there is no commonly accepted definition for the concept of financial stability, since huge measures are required to sustain the stable financial system (Van den End, 2006). However, there have been some efforts to define financial stability. For example, Davis (2001) and Padoa-Schioppa (2003) define financial stability in terms of the ability of the financial system to absorb external shocks, which leads to the absence of negative effects on the real economy. Houben, Kakes, and Schinasi (2004) define it by the well-functional role of the financial system represented by providing critical functions such as risk management and resource allocation. Allen and Wood (2006) define financial stability as a state of affairs in which events of instability are unlikely to occur. Based on the above arguments, financial stability is a status in which the financial system can absorb economic shocks and can smoothly fulfill its principal functions. Therefore, the concept of financial stability illustrates the condition where the financial intermediation functions are performed smoothly thus building confidence among stakeholders (Jahn & Kick, 2011; Makkar & Singh, 2013).

The financial system is considered stable when it is eligible for facilitating rather than preventing economic performance and diluting the financial imbalances appeared as a result of some internal system pro-

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gress, or due to adverse or significant unexpected events (Schinasi, 2004; Kasman & Carvallo, 2014). Financial stability of any country is a crucial element in attracting international business by enhancing foreign capital inflows. The stability of the financial system is an important catalyst for economic growth due to its basic rolef facilitating funds from surplus units to deficit units in an efficient manner, thereby stimulating economic growth (Mishkin, 1999; Gan, 2004; Ratnovski, 2013). However, financial stability aims to enhance banks' and other financial institutions' capacity to counter risks and mitigate any structural imbalances. In this context, financial stability requires that the financial system not only be able to minimize financial crises probability, but also be able to deal with and absorb shocks proactively.

One of the significant issues in the banking literature is the relationship between financial stability and banking sector soundness. However, the related literature provides various aspects of this relationship. For example, Moorhouse (2004), Kato and Hagendorff (2010), and Almahadin and Tuna (2019) assert that the banking sector soundness is one of the vital requirements for supporting the health of a country's financial system. Swamy (2014) defines bank soundness as the bank's ability to manage its operations under hostile events, such as policy changes within a liberalization era of the financial industry. Thus, it reflects the bank's capability to be solvent under unfavorable economic conditions through their capital and reserve accounts. Therefore, banking soundness measures the health of the financial system of a certain country, which is one of the major duties of the regulatory bodies in any economy (Lindgren, Garcia, & Saal, 1996; Hartmann, Straetmans, & De Vries., 2005; Mirzaei, Moore, & Liu, 2013; Shijaku, 2017; Almahadin, 2020). Geoff (2009) posites that a sound banking sector leads to a stable financial system, and as a result, to economic growth.

Based on the above discussion, this study aims to investigate the relationship between financial stability and the soundness of the Jordanian banking sector. In Jordan, the financial system is classified as a bank-based system; it depends heavily on the banking sector, for which the economic activities are mainly financed by the commercial banks that play an utmost role in the Jordanian economy. Banks in Jordan are considered the strongest segment of the country's financial sector, it accounts for almost 20% of GDP as of mid-2018, making it one of the largest economic sectors in the kingdom, with total assets amounting to 176% of GDP in 2016. By the end of 2018, the consolidated total banks' assets amounted to USD 71.8 billion, while its total deposit was USD 47.8 billion at the end of 2017. Regarding total credit facilities provided by Jordanian banks, they amounted to USD 36.8 billion. The sector's capital adequacy ratio increased from 18.4 percent in 2014 to around 19 percent in 2016. The number of banks operating in Jordan currently stands at 27 banks, of which eleven are branches of foreign banks and 16 are listed banks, three of them are Islamic banks (CBJ, 2018). Despite the sound financial position of the Jordanian banking system, the operating environment suffers from various local and regional challenges: potential low GDP growth, elevated unemployment, high competition, and volatile economic and political environment in the neighboring countries. These challenges may harm both the stability of the financial system and the soundness of the banking sector.

1. LITERATURE REVIEW

Preserving financial stability is one of the main objectives of a country's regulatory bodies, decision-makers, and central banks across the globe. The issue of financial stability became one of the most discussed in the financial literature. Banking soundness is considered among the major factors affecting financial stability. Therefore, a number of studies have investigated the financial stability and banking soundness relationship from different aspects. For example, Uddin and Masud (2015) have investigated the relationship between financial stability and banking soundness in Bangladesh by employing different indicators and statistical tools. The research recommended some actions could be implemented by financial institutions and regulatory bodies to ensure banking soundness. For the same country, Rahman (2017) evaluated the banking soundness of the banking sector using a multi-indicator model in addition to evaluation of the financial stability. The study

revealed that all sampled banks were found to be individually sound and the financial system was in a favorable stable situation. For Nepal, Kattel (2014) investigated the financial stability-banking soundness relationship and found that banking institutions were sound. The study also recommends that bankers should work seriously to avoid the insolvency issues through proper control and supervision policy at the operational level.

Another aspect is that the banking soundness can be investigated through the situation with competition in the banking industry. In this line, Marcus (1984) and Carletti and Hartmann (2003) have asserted that competition brings impairment to the financial system. They state that more competition crumbles market power, reduces profit margin and exposes banks to more risks, which ultimately harms financial stability. However, some other studies debate for the opposite view, proclaiming that much competition enhances financial stability. Among other studies, Boyd and De Nicolo (5002), and Schaeck, Cihak, and Wolfe (2009) have reached empirical evidence that more competitive banking systems are sound with a lower probability of failure. Boot and Thakor (2000) posit that large banks work toward keeping their reputation and competitive position in the market and, therefore, focus on granting credits to a special category of clients, which maximizes their market value and increases their investments' returns, thus, realizing financial stability. Almazari (2012) asserts that commercial banks have to learn and adapt to the changing environment if they are willing to sustain and to be competitive and perform their function effectively. Like other institutions, commercial banks are actively involved in strategies that will qualify them to respond to the environmental challenges to be more sound and solid.

Boyd and Runkle (1993) document that the specific factors of the banking-sector (such as loans size, capital adequacy and deposit size) are considered as the main indicators of the banking soundness. De Nicolo (2000) postulates that if banks are unable to utilize assets to generate revenue, they cannot remain stable in the long run. Fell and Schinasi (2005) pointed out that financial stability must be in conformity with the nature of the economy and that it is determined by the limit of integration and interaction with all economic activities of the market. Rasiah (2010) states that the 2008 subprime financial crisis has learned the world a severe lesson after a number of important banking institutions had gone bankrupted or recorded huge losses, leading to a high risk of the stability of the financial systems worldwide. Lin and Yang (2016) concluded that strong bank elements, such as liquidity, asset quality, capital adequacy, profitability and management capability in addition to the favorable economic environment, will reinforce financial stability.

2. RESEARCH METHODOLOGY

As previously mentioned, the main purpose of this study is to explore the role of banking soundness in the financial stability of Jordan. To capture this purpose, the following functional model is suggested:

$$\begin{aligned} &Financial\ Stability = \\ &= f\left(Banking\ Soundness\right). \end{aligned} \tag{1}$$

The above model expresses that financial stability is a function of banking soundness; it indicates that financial stability is mainly construed through banking soundness indicators. Accordingly, the functional model of Equation (1) should be rearranged as an econometric model as follows:

$$\begin{aligned} ZS_t &= \alpha_0 + \beta_1 CA_t + \beta_2 NPL_t + \\ &+ \beta_3 GD_t + \beta_4 DC_t + \beta_5 RIR_t + \\ &+ \beta_6 GDP_t + \pi_0\, Dummy_t + \varepsilon_t. \end{aligned} \tag{2}$$

In Equation (2), *ZS* is a Z-score; the proxy of financial stability as measured by the fraction of aggregate return on assets (ROA) plus the equity-to-asset ratio to the standard deviation of ROA. The banking soundness indicators are *CA*, *NPL*, *GD*, and *DC*, respectively. *CA* is a capital adequacy ratio, *NPL* is the nonperforming loans to total assets ratio, *GD* is a growth rate of customer deposits, and DC is the domestic credit facilitated by the banking sector as a portion of *GDP*. The real interest rate (*RIR*) and the annual growth rate of gross domestic product per capita (*GDP*) are control variables. *RIR* is used to capture the role of the Jordanian monetary policy as one of the key domains that affect financial stability and the

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banking sector simultaneously. *GDP* is a macroeconomic variable used to explore the role of economic growth in financial stability; presumed as one of the significant elements that affect financial stability. It is worthy to mention that all of the variables are aggregate metrics collected for the banking sector as a whole during the time period of *t*, which refers to the time series data of each variable spanning from 2003 to 2018. β's (β_1 to β_6) are the model coefficients o be estimated. Finally, α is the constant term, and ε is the error term. To capture the possible influences of the recent global financial crisis, a dummy variable (*Dummy*) is entered into the functional model with a value of 1 at trouble years (2008–2010), and a value of zero otherwise. The data of *CA*, *NPL*, and *GD* are gathered from the CBJ (2019), while *ZS*, *DC*, *RIR*, and *GDP* are downloaded from the World Bank (2019) databank.

The theoretical setting of the suggested model is that the financial systems of the developing economies, Jordan as a sample, are characterized as bank-based systems. This means that the banking sector is the main player in emerging economies, which, definitely, affects the healthy conditions of both the financial system and economic growth of a certain country. Thus, a stable banking sector is a vital requirement for financial stability and, as a result, for economic stability. In developing economies, the healthy and well-functional banking sectors are considered among the main issues in maintaining relatively stable financial systems. Therefore, the theoretical background provides enough arguments to use a banking stability index (bank Z-score) as a proxy of financial stability to empirically investigate the role of banking soundness in financial stability, especially in emerging economies.

Econometrically, this study adopts the Fully-Modified Ordinary Least Square approach (FMOLS) of Philips and Hansen (1990) to estimate the model suggested in Equation (2). There are many advantages and reasons for adopting this approach rather than other available approaches: it produces reliable and more robust estimated coefficients for a small sample, as in this study; a single Cointegration equation can be estimated for a set of first-order integrated variables, I(1); *t*-statistics of the long-term estimated coefficients are more valid to avoid the inference problems that are inherent in other used approaches (Amarawickrama & Hunt, 2008); besides, the mechanism of this approach deals with the prospective effects that may arise from the serial correlation and/or the endogeneity problem in the explanatory variables that may exist in a cointegration relationship (Kalim & Shahbaz, 2009).

3. EMPIRICAL FINDINGS

3.1. Descriptive analysis

The main descriptive statistics of the considered variables are presented in Table 1. These statistics provide valuable informative content to achieve a deep understanding of the raw data of the study. Regarding the financial stability index (*ZS*), the average value was around 50.74 percent, while the maximum and minimum values were 61.16 percent and 32.23 percent, respectively. In general, the high value of the Z-score is a good indicator of the health of the financial system, as it provides evidence for a steady financial system. It is worthy to mention that the historical values of the Z-score of Jordan, during the period of the study, show that the most values, 12 out of 16 observations, were greater than 50 percent. Therefore, one can conclude that the financial system of Jordan is stable.

In terms of the soundness indicators of the Jordanian banking sector, the arithmetic mean of the capital adequacy ratio is recorded at 18.70 percent, while the maximum and minimum values were 21.4 percent and 15.9 percent, respectively. The CBJ requires the banking sector to maintain at least a *CA* ratio of 14 percent, which is above the international requirements of 12 percent at least. Thus, the Jordanian banking sector maintains a *CA* ratio above the minimum international and local regulatory requirements, which indicates a sound banking sector. The statistics of the *NPL* ratio indicate a relatively small values, as the mean value was 6.7 percent, while the maximum value was 15.5 percent. Throughout the period of the study, it is noticed that the *NPL* ratio is observed to be relatively high, above 10 percent, only in the last two years. In general, high *NPL* ratio is undesirable since it indicates an increase in the portion

Table 1. Descriptive statistics

Item	ZS	CA	NPL	GD	DC	RIR	GDP
Mean	50.738	18.700	6.700	8.443	106.119	3.528	0.477
Median	54.610	18.450	6.100	9.450	108.645	4.910	–0.065
Maximum	61.160	21.400	15.500	15.900	114.320	7.000	5.720
Minimum	32.230	15.900	4.100	0.900	83.960	–9.970	–2.880
Std. dev.	9.001	1.411	3.021	4.696	8.342	4.397	2.877
Jarque-Bera	2.833	0.054	11.308	1.049	8.031	19.640	1.396
P-value	0.242	0.973	0. 3503	0.591	0.180	0.094	0.497

Note: ZS, *CA*, *NPL*, *GD*, *DC*, *RIR*, and *GDP* are considerable variables as they were all defined before in the research methodology part. Jarque-Bera is a normality test with a null hypothesis of the normally distributed individual variable.

of nonperforming (default) loans to total loans; this can be attributed to the economic challenges facing the Jordanian economy in the last few years due to political instability in the neighboring countries. Regarding the *GD* and *DC* ratios, the presented values provide a good statistics supporting the banking sector soundness.

Regarding the macroeconomic factors, the average value of *RIR* is observed, 3.5 percent, while the minimum value is recorded as a negative value of 9.97 percent that can be interpreted by high inflation rates leading to negative *RIR*. In specific, this value appears in 2008, during the recent global financial crisis, as the annual consumer price index was around 14 percent. The *GDP* per capita growth rate records average value of 0.477 percent with a maximum and minimum values of 5.72 percent and –2.88 percent, respectively; from 2010 to 2017, *GDP* rates were negative as might be interpreted by the influences of the global financial crisis in addition to a political instability of the neighboring countries that affect Jordan adversely. Finally, as clearly shown in the last row of Table 1, all of the variables have normal distribution, since the null hypothesis of the Jarque-Bera test cannot be rejected for each individual series.

3.2. Unit root testing

Table 2 provides a summary for the test statistics of the Augmented Dickey-Fuller test (ADF). The ADF is developed by Dickey and Fuller (1981) to test the possible existing unit root in each of the individual series, which is one of the most important pre-requirements of time series analysis. The testing of this issue provides a piece of significant information to determine the integration order of each of the considerable variables and then estimate the suggested functional model by the appropriate approach. As clearly shown in Table 2, all variables (*ZS*, *CAR*, *NPL*, *GD*, *DC*, *RIR*, and *GDP*) are found to be non-stationary at the level values, as the null hypothesis of the ADF test of the individual series with a unit root (non-stationary) has not been rejected at all cases. Whereas all individual variables have become stationary at the first difference, these variables are transformed into the first difference. To sum up, the last column of Table 2 summarizes that all of the considered

Table 2. Series stationary testing with the ADF test

Variable	Test statistics (levels)			Test statistics (first differences)			Integrated order
	τ_T	τ_μ	τ	τ_T	τ_μ	τ	
ZS	–2.665	–2.310	–0.853	–2.471	–2.430	–2.321**	I(1)
CA	–2.585	–2.476	–0.107	–2.985	–2.939*	–3.101***	I(1)
NPL	–2.772	–2.212	–0.814	–2.330	–1.944	–1.978**	I(1)
GD	–3.242	–2.222	–0.723	–3.213	–3.627**	–3.853***	I(1)
DC	–2.639	–2.663	–0.930	6.038**	–2.877*	–2.902***	I(1)
RIR	–2.487	–1.432	–0.903	–9.638**	–9.435***	–9.817***	I(1)
GDP	–1.153	–2.683	–0.883	–5.072***	–4.045***	–3.882***	I(1)

Note: ADF is the Augmented Dickey-Fuller test of unit root. τ_T, τ_μ, and τ represent the test statistics of the estimated ADF models with a trend and intercept, with an intercept only, and without a trend nor intercept (none), respectively. ***, ** and * denote the rejection of the null hypothesis of the individual series with non-stationarity (has a unit root) at the 0.01, 0.05 and 0.10 levels, respectively. I(1) denotes that the individual series is integrated at the first order. *ZS*, *CA*, *NPL*, *GD*, *DC*, *RIR*, and *GDP* are considerable variables as they were all defined before in the research methodology part.

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Table 3. Cointegration tests and VIF analysis results

Panel A: Cointegration testing					
Test	**Variable**	**Coefficient**	**Std. error**	***t*-statistic**	***P*-value**
Phillips-Ouliaris	RESED (–1)	–0.8312	0.2634	–3.1551	0.0077
Engle-Granger	RESED (–1)	–0.8342	0.2637	–3.1636	0.0069

Panel B: Variance inflation factors			
Variable	**Coefficient variance**	**Uncentered VIF**	**Centered VIF**
CA	0.7627	30.9898	1.2424
NPL	0.1251	7.8688	1.2637
GD	0.1065	11.8291	2.3097
DC	0.0354	46.7025	1.3949
RIR	0.0598	1.9935	1.2552
GDP	0.2200	2.0650	2.0288
Constant	0.6186	70.1801	NA

Note: The null hypothesis of both Phillips-Ouliaris and Engle-Granger tests is that the variables are not cointegrated. *ZS*, *CA*, *NPL*, *GD*, *DC*, *RIR*, and *GDP* are considerable variables as they were all defined before in the research methodology part.

series are integrated at the first order, I(1). This, in turn, provides permission to use traditional regression analysis to estimate the functional model of Equation (2).

3.3. Cointegration and VIF analysis

To make the empirical analysis more comprehensive, two tests are used to check the existence of a cointegration relationship between the considered variables: Phillips-Ouliaris and Engle-Granger, with the same null hypothesis that the variables are not cointegrated. As panel A of Table 3 shows, the null hypotheses of both tests are rejected since the estimated coefficients of RESED (–1) are statistically significant at a significance level of 0.01. These results imply that there is a long-term association (cointegration relationship) between the variables, signaling that the considered variables are moving together in the long term. Moreover, the variance inflation factor (VIF) analysis is applied to check for the possible multicollinearity among the regressors. The results of VIF analysis are reported in panel B of Table 3, which provides strong evidence of the absence of a multicollinearity problem in the estimated model. This result has been also confirmed by analyzing the correlation matrix; it presents the correlation coefficient between each pair of the independent variables to explore if there is a strong linear relationship between the variables. The outcomes of the correlation matrix affirm that the most correlation coefficients among the variables are relatively weak, with values almost less than |0.50|; this supports the result of VIF reasserting the absence of the multicollinearity problem[1].

3.4. Regression analysis

The empirical outcomes of the regression analysis of the FMOLS method are reported in Table 4. The estimated coefficient of the CA ratio has the highest value compared to other coefficients; this assigns this ratio as one of the most important indicators of banking soundness. The estimated value was 1.68 percent with a too high t-statistic value of 26.97 to be statistically highly significant at the 0.01 significance level. From a statistical perspective, this coefficient can be interpreted as any 1 percent increase in the aggregate capital adequacy ratio of the banking sector of Jordan that can lead to an increase in the financial stability score by around 1.68 percent. This can be reasonable from the banking aspect, since the relative size of bank equity capital to weighted risky assets increases as the financial system, the banking system in specific, becomes more solid and stable to face any unexpected fluctuations or losses. In the same manner, all of the remaining banking soundness indicators are found to have a positive impact on financial stability, except the *NPL* ratio. The estimated coefficient of the *NPL* ratio was negative with a value of around 0.65 percent; this indicates that any increase in the *NPL* ratio negatively affects financial stability, which is an undesirable situation.

1 The correlation matrix is not reported here to save space, but is available upon request.

Regarding the macroeconomic factors, the estimated parameter of *RIR* was recorded as a negative value of 0.1715 with an absolute t-statistic value of 9.80 to be statistically significant at the significance level of 0.01. This result is compatible with the arguments of Podder (2012) that signal the adverse impact of the local monetary policy, especially the interest rate policy, on financial stability. Accordingly, at least two issues can be recognized by this result: first, when the interest rate policy is designed to be stable, the financial system also becomes stable, and vice versa; second, high inflation rates can lead to harmful influences on the financial system. In contrast, the estimated parameter of *GDP* is positive and statistically significant to signal the positive role of economic growth in supporting the financial stability of emerging economies, which is in line with Ferguson (2010). Finally, the bottom row of Table 4 provides selected diagnostic statistics of the estimated model that records the coefficient of determinant (*R*-square) is 0.8122, indicating that the banking soundness indicators have explained around 81.2 percent of changes in the financial stability index (Z-score). Whereas the long-run variance of the regression model was relatively too small at 0.067, the value of DW statistic was strongly close to the rule of thumb value of 2, indicating that there was no autocorrelation problem in the estimated model.

Table 4. Regression estimates of the FMOLS approach

Variable	Coefficient	Std. error	*t*-statistic	P-value
CA	1.6847	0.0624	26.9710	0.0000
NPL	–0.6456	0.0253	–25.5145	0.0000
GD	0.4359	0.0233	18.6722	0.0000
DC	0.7232	0.0134	13.7011	0.0000
RIR	–0.1715	0.0174	–9.8049	0.0011
GDP	1.5310	0.0335	25.6321	0.0000
Constant	–5.7048	0.1778	12.0683	0.0127

Note: Diagnostic statistics: R-square (0.8122), adjusted R-square (0.8015), long-run variance (0.0676), and Durbin-Watson statistic (1.987). *ZS*, *CA*, *NP*L, *GD*, *DC*, *RIR*, and *GDP* are considerable variables as they were all defined before in the research methodology part.

CONCLUSION AND POLICY IMPLICATIONS

This study focuses on the relationship between banking soundness and financial stability of Jordan as an example of an emerging economy. To achieve the main objective, the data consist of a set of variables gathered from different sources for the period 2003–2018. The analytical part was built using different statistical and econometric techniques. The financial system of Jordan seems to be stable with relatively high values of the financial stability index, Z-score. The banking soundness indicators serve as a good signal that the banking sector of Jordan is sound and solid. The test statistics of the unit root test reveal that all of the considered variables are nonstationary at the level, but they became stationary at the first level; first-order integrated. The cointegration analysis indicates that the variables of the functional model have a long-term equilibrium relationship; they move together in the long term. The empirical outcomes of the FMOLS approach indicate that the majority of the banking soundness indicators positively affect financial stability. Among the banking soundness indicators, the *CA* ratio was the most important factor positively affecting financial stability with the highest estimated coefficient. Logically, this result can be interpreted in terms of the fact that the high *CA* ratio means that the relative size of bank equity capital to the weighted risky assets is high, which indicates a sound banking sector that can ultimately cover possible fluctuations in the asset value and support a more stable financial system. In contrast, the *NPL* ratio is found to affect financial stability adversely. From a banking perspective, this result is sensible, indicating that as the relative size of nonperforming loans increases, the stability of the financial system will be threatened. To capture macroeconomic factors, *RIR* and *GDP* were used in the estimated model as control variables; the results indicate that the estimated coefficients of these variables are negative and positive, respectively. The negative value of the *RIR* coefficient provides important implications for decision-makers who are serious in maintaining a steady interest rate policy, in which it is one of the key macroeconomic policies that have a strong impact on the stability of the financial system. Whereas the observed financial stability responds positively to changes in the economic growth indicators, as economic growth progresses, the stability of the financial system becomes healthier. The findings of this study provide decision-makers

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with important policy implications that can help them in maintaining a stable financial system. Both authorities and supervision bodies must pay considerable attention to maintaining a sound banking sector as the main supportive sector of the financial system.

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Data curation: Hamed Ahmad Almahadin, Thair Kaddumi.
Formal analysis: Hamed Ahmad Almahadin, Qais AL-Kilani.
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