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The emerging face of the HIV epidemic in the Middle East and North Africa

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Purpose of review

A volume of quality HIV data has materialized recently in the Middle East and North Africa (MENA). This review provides a thematic narrative of the patterns of HIV infection transmission in this region in light of these data.

Recent findings

Tens of integrated bio-behavioral surveillance surveys among hard-to-reach key populations at higher risk have been conducted in MENA in the recent years. Many of the studies reported appreciable and growing HIV prevalence. A few studies found alarming prevalence of as much as 87.2% HIV prevalence among people who inject drugs in Tripoli, Libya. The discovery of these hitherto hidden epidemics was unsettling to some authorities after years in which the importance of a focus on HIV prevention among key populations was not recognized.

Summary

The new data from MENA indicate growing HIV epidemics among key populations across the region. There is heterogeneity, however, as to which key populations are affected and in what proportions in different countries. In a few countries, HIV appears to affect only one key population and often there is substantial geographical heterogeneity in HIV transmission. Data are indicative of a growing HIV disease burden in this part of the globe, in contrast with the declining epidemics in most other regions.

Keywords

emerging epidemic, epidemiology, HIV, Middle East and North Africa

INTRODUCTION

Our knowledge of the HIV epidemic in the Middle East and North Africa (MENA) has progressed rapidly, with most of the evidence and quality studies being conducted in the last few years [1]. The progress is a consequence of a concerted effort involving national programs, international organizations and donors, and academia to address the dearth of HIV data [2]. Perhaps, the most significant achievement has been the strengthening of surveillance research in multiple countries. Tens of integrated bio-behavioral surveillance surveys (IBSS) have been conducted using state-of-the-art sampling methodologies for hard-to-reach key populations at higher risk [2,3^{*}]. There are still large gaps in our understanding of HIV dynamics in MENA; the availability of data varies extensively from one country to another [1]. We review here the main themes of our current understanding of HIV epidemiology in MENA, in light of a volume of data that have become available since 2010. We also discuss key aspects that challenge a satisfactory understanding of the epidemic in MENA.

This review covers the 23 countries that are part of the MENA definitions of the three United Nations organizations leading most HIV/AIDS efforts in the region: the Joint United Nations Programme on HIV/AIDS (UNAIDS), the Eastern Mediterranean Regional Office of the World Health Organization

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KEY POINTS

- There are emerging, and sometimes rapidly growing, HIV epidemics among the key populations at higher risk in multiple countries in the MENA.
- Different countries are affected by the HIV epidemic in different key populations, and in some countries only one key population is affected.
- There is often within-country geographic heterogeneity in HIV transmission among the different key populations, and HIV prevalence can vary substantially from one locality to another.
- Main challenges to a better understanding of HIV epidemiology in the MENA include identifying hidden HIV epidemics among the key populations, a poor estimation of HIV disease burden, and reconciling sometimes contradictory data from different sources.

(WHO/EMRO), and the World Bank. These countries share historical, sociocultural, linguistic, and religious characteristics; and are usually included together as part of HIV/AIDS programming for the region (Fig. 1).

HIV EPIDEMICS IN MIDDLE EAST AND NORTH AFRICA: WHAT WE KNOW

Few themes define the emerging face of HIV epidemiology in MENA as discussed below.

A low HIV prevalence region

Several decades after the first cases of HIV infection were reported in the region, MENA continues to be characterized by a low HIV prevalence in the population, at less than 0.2% in most countries [4–6]. This trend is consistent in both old and new data including thousands of point-prevalence surveys that have accumulated over the years from different sources including individual studies, sentinel surveillance, and HIV-testing databases of different population groups [4]. Djibouti and part of Somalia are exceptions to this trend, where HIV prevalence among pregnant women has exceeded 1%, but this appears to reflect the larger epidemics in commercial heterosexual sex networks in these countries compared with other countries of the region [4,7].

A trend of emerging HIV epidemics in key populations at risk

The most distinctive feature of the epidemic in MENA that manifested itself in the new data is the rising HIV epidemics among key populations including people who inject drugs (PWID), men who have sex with men (MSM), and to a lesser extent female sex workers (FSWs) [8*,9*,10]. The majority of the epidemics appears to be relatively recent with emergence within the last decade. Most epidemics appear to be growing with a trend of increasing HIV prevalence in multiple countries. Table 1 displays HIV prevalence among key populations per the most recent available IBBSS studies;



FIGURE 1. Map of the MENA region including the countries that are covered in this review. MENA, Middle East and North Africa. Reproduced with permission from [2].

Table 1. HIV prevalence among the key populations at higher risk in the countries of the Middle East and North Africa. These data were compiled based on the results of tens of integrated bio-behavioral surveillance surveys in the period of 2010–2012. The table includes also few earlier measurements relevant for the narrative of this review

	PWID		MSM		FSWs	
	Year	%	Year	%	Year	%
Afghanistan	2012	0.3–13.3	2012	0.4	2012	0.0–0.9
Algeria	–	–	–	–	–	–
Bahrain	–	–	–	–	–	–
Djibouti	–	–	–	–	2009	15.4
Egypt	2010	6.5–6.8	2010	0.0–6.9	2010	0.0
Iran	2011	15.2	–	–	2010	4.5
Iraq	–	–	–	–	–	–
Jordan	2009	0.0	2009	0.2	2009	0.0
Kuwait	–	–	–	–	–	–
Lebanon	2007	0.0	2007	3.6	2007	0.0
			2011	0.7		
Libya	2011	87.2	2011	3.0	2011	16.0
Morocco	2011	0.4–25.1	2011	2.8–5.6	2011	0.0–5.1
Oman	–	–	–	–	–	–
Pakistan	2012	3.3–52.5	2012	0.0–5.9 ^a	2012	0.0–1.9
				0.0–14.9 ^b		
Palestine	2010	0.0	–	–	–	–
Qatar	–	–	–	–	–	–
Saudi Arabia	–	–	–	–	–	–
Somalia	–	–	–	–	2007	5.3
Sudan	–	–	2011	0.0–6.3	2011	0.0–7.7
Syria	–	–	–	–	–	–
Tunisia	2011	0–2.7	2011	0.0–16.0	2011	0.0–1.2
U.A.E. ^c	–	–	–	–	–	–
Yemen	–	–	2010	5.9	2010	0.0

Note: A range indicates HIV prevalence in multiple cities. FSWs, female sex workers; PWID, people who inject drugs.

^aMale sex workers.

^bTransgender people.

^cUnited Arab Emirates.

and Table 2 describes the status of the epidemic in these populations based on all available data including both recent and old data.

There are emerging concentrated HIV epidemics among PWID in several MENA countries including Afghanistan, Egypt, Morocco, and Pakistan [9[¶]]. HIV prevalence among PWID has increased steadily in the repeated rounds of surveillance in Pakistan from 10.8% in 2005 to 37.8% in 2011–2012 [11–14,15[¶]], and in Egypt from 0.6% in 2006 to 6.7% in 2010 [16–18]. Iran is the only country where the epidemic among PWID has saturated nationally and is now established at concentrated levels of about 15% [9[¶],19–21]. In the first IBBSS conducted in Libya in 2010–2011, Tripoli had the highest reported HIV prevalence among PWID in MENA at 87.2% [22[¶]]. Although the epidemic among PWID in Libya

has been documented only recently and may have saturated at a high level, it was suspected for several years based on HIV testing and case notification data [4,7,9[¶]]. The epidemic also appears to be older than most other epidemics in MENA, with an emergence date probably in the late 1990s [4,7,22[¶]].

In a few countries in MENA with insufficient surveillance data such as Bahrain and Saudi Arabia, the growing contribution of injecting drug use to the total notified cases is indicative of appreciable HIV transmission among PWID [9[¶]]. Very limited HIV transmission appears to occur among PWID in some countries including Jordan, Lebanon, Palestine, and Syria based on surveillance and case notification data (Tables 1 and 2) [9[¶]].

A similar pattern of emerging HIV epidemics is observed among MSM [8[¶]]. After years of limited

Table 2. Evidence of appreciable HIV transmission among the key populations at higher risk in the countries of the Middle East and North Africa. These results are based on a triangulation of data from multiple lines of evidence including both recent and older data

	PWID	MSM	FSWs
Afghanistan	Yes	No	No
Algeria	Unknown	Unknown	Unknown
Bahrain	Possibly	Unknown	Unknown
Djibouti	Unknown	Unknown	Yes
Egypt	Yes	Yes	No
Iran	Yes	Possibly	Possibly
Iraq	Unknown	Unknown	Unknown
Jordan	No	Possibly	No
Kuwait	Unknown	Unknown	Unknown
Lebanon	No	Yes	No
Libya	Yes	Possibly	Yes
Morocco	Yes	Yes	Yes
Oman	Possibly	Possibly	Unknown
OPT	No	Unknown	Unknown
Pakistan	Yes	Yes	Possibly
Qatar	Unknown	Unknown	Unknown
Saudi Arabia	Possibly	Unknown	Unknown
Somalia	Unknown	Unknown	Yes
Sudan	Unknown	Yes	Yes
Syria	No	Possibly	Unknown
Tunisia	Possibly	Yes	Possibly
U.A.E. ^a	Unknown	Unknown	Unknown
Yemen	Unknown	Yes	No

Yes: There is evidence of appreciable HIV transmission based on different types of available data, No: There is no evidence of appreciable HIV transmission based on different types of available data, Possibly: There is some evidence of HIV transmission based on different types of available data, but the evidence is not conclusive, Unknown: The data are too limited to know the potential status of HIV transmission. FSWs, female sex workers; PWID, people who inject drugs.
^aUnited Arab Emirates.

transmission, HIV prevalence among MSM showed a remarkable increase around 2003 (Fig. 2). Although HIV prevalence remains at rather low to intermediate levels (generally below 10%), emerging concentrated epidemics among MSM have been recently documented in several countries including Egypt, Morocco, Pakistan, Sudan, Tunisia, and Yemen (Tables 1 and 2) [8^{*}]. HIV prevalence among transgender people in Pakistan increased steadily from 0.8 to 7.2% between 2005 and 2011–2012 [11–14,15^{*}]. Similarly in Tunisia, HIV prevalence among MSM increased from 4.9% in 2009 to 13.0% in 2011 [23,24]. Case notification reports also indicate that HIV transmission among MSM is present and that its relative contribution is increasing in several countries such as Egypt, Jordan, Lebanon, Oman, and Syria (Fig. 3).

Overall, considerable HIV prevalence has not been documented among FSWs in MENA. The highest prevalence is reported in Djibouti at up to 20.0% in facility-based surveys in 2007–2009 [24].

Concentrated HIV epidemics among FSWs are found in at least parts of Libya, Morocco, Somalia, and Sudan (Tables 1 and 2). In Eastern Sudan, 5.0 and 7.8% of FSWs in two cities were found to be infected with HIV [25^{*}]; and in Tripoli, Libya, 15.7% were infected [26]. The region, however, does not appear to have witnessed rapidly growing HIV epidemics among FSWs, and in several countries, the epidemic among FSWs appears to be stable at relatively low prevalence. In Morocco, and despite a concentrated epidemic in Agadir [27], the epidemic seems to be hovering around a national prevalence of only about 2% for over a decade [28].

Despite the overall relatively low HIV prevalence among FSWs, commercial heterosexual sex networks appear to be a main driver of HIV incidence in at least few countries, probably because of the larger size of these networks compared with PWID and MSM networks. In Morocco, as confirmed by a recent HIV Modes of Transmission

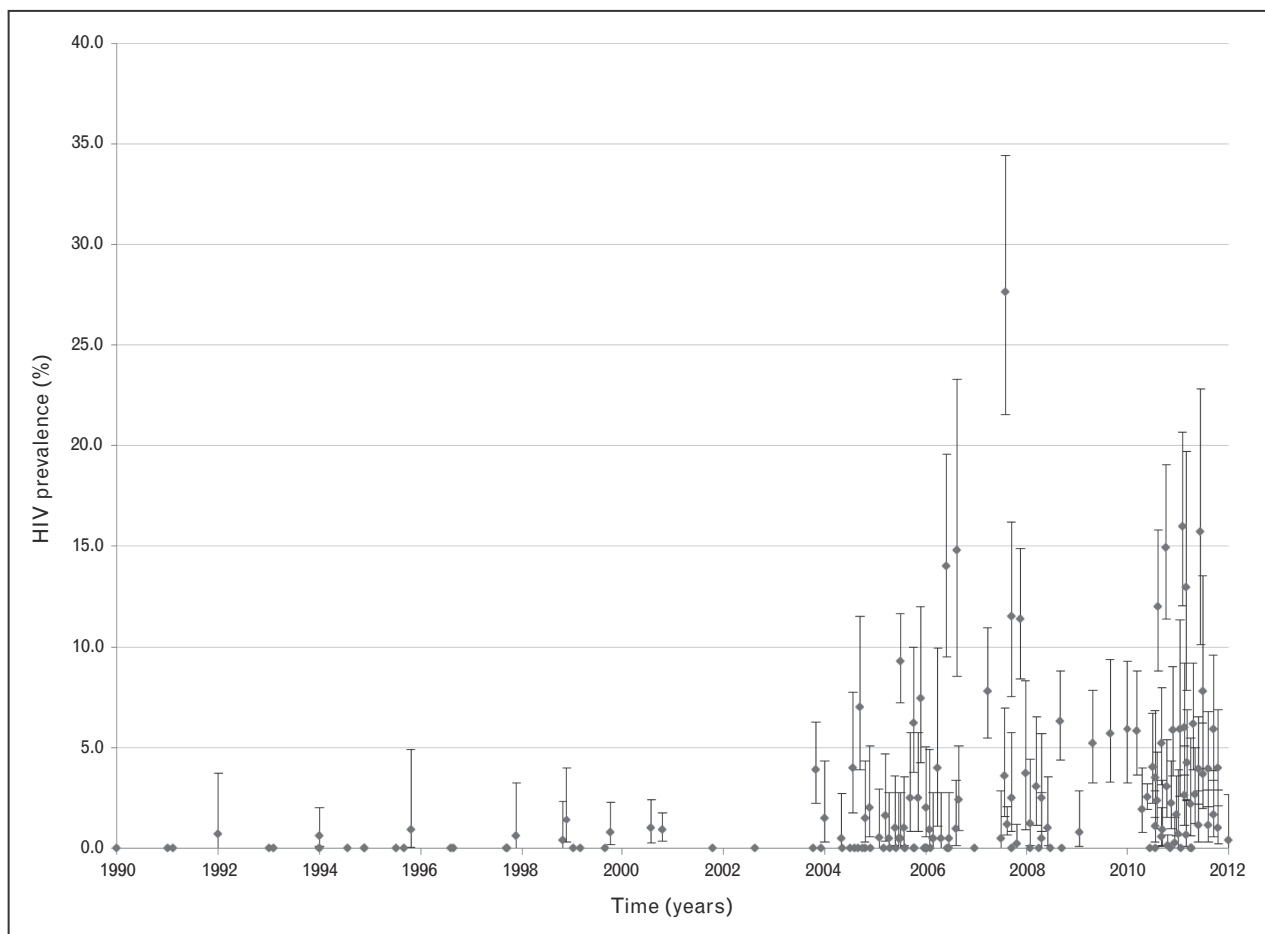


FIGURE 2. Trend of HIV prevalence among men who have sex with men in the Middle East and North Africa, 1990–2012. The figure is adapted from [8^{*}] with permission, but updated with the most recent rounds of surveillance (2010–2012) and including city-level prevalence data.

(MoT) modeling analysis, commercial heterosexual sex networks contributed about half of HIV incidence despite a rather low HIV prevalence among FSWs of about 2% [29^{*}].

For several countries, it is not clear how much of the observed HIV prevalence among FSWs truly reflects acquisition through heterosexual sex versus acquisition through injecting drug use. This situation is specifically the case in countries with large epidemics among PWID. In Iran, about 15% of FSWs reported injecting drugs [30], and these were over three times more likely to be HIV infected compared with FSWs who never injected drugs [30]. It is plausible that most of HIV infections among FSWs in Iran could be due to drug injection rather than sexual transmission.

For a considerable fraction of MENA countries, recent data affirm very low HIV prevalence among FSWs as consistently observed in Afghanistan, Egypt, Jordan, Lebanon, Pakistan, Tunisia, and Yemen (Tables 1 and 2).

Heterogeneity in key populations at risk affected

There is large heterogeneity across countries as to which key populations are proportionally affected by the epidemic, as opposed to others (Table 2). Most HIV transmissions in Iran and Pakistan appear to be driven by the large HIV epidemics among PWID in these countries [9^{*},31]. This situation is, however, not the case in Lebanon and Tunisia where HIV transmission among MSM seems to be dominant [24]. Similarly, substantial HIV prevalence is found among FSWs in Djibouti and probably Somalia, but generally this is not the case in other MENA countries.

There seems to be some instances of regionalization of the key populations affected, with neighboring countries being affected by similar epidemic dynamics. Large HIV epidemics are found among PWID in the three neighboring countries of Iran, Pakistan, and Afghanistan [9^{*}]. Similarities in viral subtypes between these countries suggest

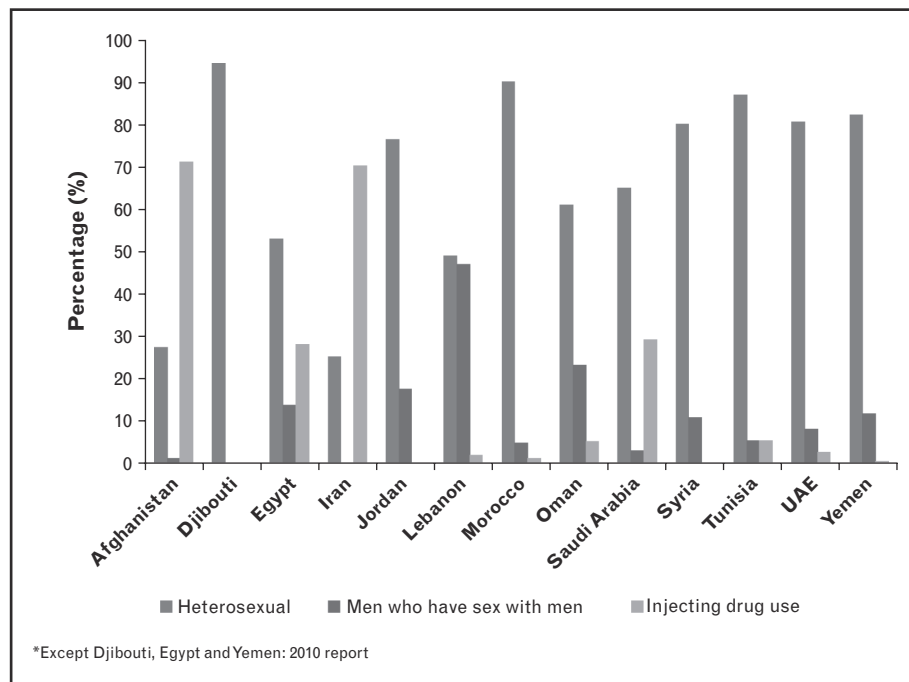


FIGURE 3. Proportion of total notified HIV cases (2011*) that are the result of heterosexual practices, men who have sex with men, or injecting drug use exposures in the countries of the Middle East and North Africa with available data [24]. Original figure, data from [24].

circulation of the virus across national borders following the drug trade routes in this part of MENA [10,32,33]. The epidemic that started in Iran may have moved from there to Pakistan and Afghanistan. It is believed that HIV might have been introduced to PWID in Afghanistan through the return of Afghani refugees from Iran following the fall of Taliban [10,32].

In addition to the heterogeneity on which key populations are proportionally affected, it seems that epidemic transmission in a number of countries is largely driven by only one key population, at least so far. The epidemic in Lebanon appears to be largely confined to MSM; and in Afghanistan and Iran to PWID (Table 2). This situation might be due to the rather recent nature of the epidemics in these countries where HIV infection has not yet been bridged and percolated among other key populations.

In other countries, however, the epidemic has already affected more than one key population, with the epidemic usually starting in one key population and then moving to other ones through overlapping risk behavior. This situation appears to be the case of Pakistan and Egypt. In Pakistan, the HIV epidemic among male sex workers and transgender people has closely followed the emergence of the epidemic among PWID [9^a,11–14,15^a]. Behavioral data confirmed the overlap of risk behavior with a sizable proportion of male sex workers and transgender

people being PWID themselves or having PWID sexual partners [9^a,11–14,15^a]. Molecular epidemiology evidence has also linked the HIV virus subtype among PWID in Pakistan to that among MSM suggesting that the epidemic among MSM could have been sparked by the epidemic among PWID [10]. A similar pattern, but in the opposite direction, may have occurred in Egypt, where the nascent HIV epidemic among PWID seems to have been bridged from the epidemic that occurred earlier among MSM [9^a]. This conjecture is supported by behavioral data that indicate considerable overlap of risk behavior between MSM and PWID in Egypt [16–18].

Geographic clustering of HIV epidemics

Recent data suggest within-country geographic heterogeneity in HIV transmission. In some cases, a key population in only one locality appears to be affected by the epidemic, and in other cases, different geographic regions are affected by different key populations epidemics. Morocco provides an example where the epidemic among PWID appears to be localized in Northern Morocco, and specially in Nador with a high HIV prevalence of 25.1% [28,34]. Evidence to date suggests limited HIV infection burden among PWID in the rest of the country. Nonetheless, HIV sexual transmission is focused in the South of the country, specially in Agadir where concentrated HIV epidemics among FSWs and MSM

are found. HIV prevalence in Agadir was found to be 5.1% among FSWs [27] and 5.6% among MSM [35,36].

Sudan provides another example of geographic disparities in HIV prevalence among FSWs. In a large-scale national survey conducted in 2011, concentrated HIV epidemics among FSWs were observed in Eastern Sudan (HIV prevalence 5.0–7.7%), whereas limited infection burden was detected in the other zones (HIV prevalence 0.0–1.5%) [25^{*}]. Heterogeneity in transmission is observed in other MENA countries, but may not always reflect true heterogeneity as much as incomplete national HIV surveillance.

The spatial heterogeneity in HIV transmission may be explained by the recent nature of the epidemics in MENA, and the fact that many are growing. HIV infection may have affected one key population at a specific location, but may not have yet reached the same key population in other parts of the country.

HIV EPIDEMICS IN MIDDLE EAST AND NORTH AFRICA: CHALLENGES TO OUR UNDERSTANDING

We discuss below key aspects that challenge a satisfactory understanding of the epidemic in this region.

Hidden HIV epidemics

Identifying hidden HIV epidemics among key populations remains a long-standing challenge for HIV research and programming in MENA. On the basis of a recent assessment, only four out of 23 MENA countries qualified as having functioning surveillance systems capable of tracking emerging HIV epidemics [3^{*}]. Previous experience in the region has shown that there are hidden HIV epidemics that are discovered only after IBBSS studies are conducted; sometimes too late as HIV prevalence would have reached high and even alarming levels. The first IBBSS in Libya was conducted in 2010–2011, unveiling a major epidemic among PWID with a prevalence of 87.2%, one of the highest globally [22^{*}]. The prevalence of 25.1% among PWID in Nador, Morocco was also discovered for the first time in 2008 in an IBBSS [28,34,37]. Similarly, the first IBBSS studies conducted among MSM in Egypt and Tunisia identified already concentrated epidemics with a prevalence exceeding 5% [16–18,23,24]. These discoveries of hitherto hidden epidemics were unsettling to some authorities after years in which the importance of a focus on HIV prevention among key populations was not recognized.

In several MENA countries including Algeria, Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia, Syria, and United Arab Emirates, data are scarce. The status of the epidemic remains largely unknown, not precluding the possibility of hidden epidemics. This situation is especially the case wherein case notifications suggest increasing contribution of a specific mode of exposure among recently notified HIV cases such as among MSM in Oman and Syria and PWID in Saudi Arabia (Fig. 3).

Poor estimation of HIV disease burden

MENA suffers overall from poor estimation of its HIV disease burden. Estimates in the region are typically produced by national authorities working with the Joint United Nations Programme on HIV/AIDS (UNAIDS), through application of established mathematical models used in other regions. However, the nature and volume of data in MENA are not yet conducive for a representative application of these models. The models have often been parameterized by poor data input leading in occasions to questionable estimates. Even when the estimates seemed plausible, they usually came with wide confidence intervals.

The quality of disease burden estimates can be improved by further primary data collection among key populations including IBBSS and risk group size estimations. Custom-designed mathematical models may be appropriate for some countries given the nature of available data. Although countries overall have inadequate data to power concrete estimates by UNAIDS models, there are sources of data available that have not been commonly used, but could be utilized within the context of custom-designed models. Examples of these include HIV-testing databases and case notifications.

Apparently contradictory data

The recent progress in HIV research in MENA has entailed a wider availability of different types of data sources using different lines of evidence and study methodologies. The wider data availability have confronted HIV stakeholders with a new challenge: reconciling apparently contradictory data. For example, in Tunisia, case notifications attribute 87% of HIV cases in 2011 to heterosexual sex with small contribution due to MSM (Fig. 3). The IBBSS studies, however, identified limited HIV prevalence among FSWs (0.0–1.2%), but high prevalence of up to 16.0% among MSM (Table 1) [24]. It is not clear why the large HIV prevalence among MSM is not expressed as a larger share of case notifications. It is

also not clear how these heterosexual notified cases have been acquired if there does not appear to be a significant core of HIV transmission among commercial heterosexual sex networks. This apparent contradiction was even compounded with the findings of the MoT modeling study in Tunisia, which linked the bulk of HIV incidence to MSM [24].

Similarly, case notification data suggest the presence of considerable HIV transmission among MSM in Jordan and Lebanon (Fig. 3); a fact supported by anecdotal evidence conveyed by HIV stakeholders in these countries. Yet, in both countries, recent IBSS studies reported limited HIV prevalence among MSM with most cases in the surveys being HIV-infected seeds in the respondent-driven sampling (Table 1) [24,38,39].

Some of these contradictions may be explained by the limitations in available data. Some forms of exposure may not be reported accurately in case notifications, such as those related to MSM. Some of the IBSS studies may have sampled only a 'visible' part of the key population, and may not have reached deeply into key population networks. Their findings, therefore, may not be representative of the wider population of key populations.

Although limitations in available data may explain, in part, some of these contradictions, we believe, based on the totality of available evidence, that much of these contradictions are paradoxes that reflect our incomplete understanding of HIV dynamics in some of the MENA countries. For example, size estimations of key populations are far from being adequate, and their scale may explain some of these contradictions. There is also a flow of HIV infections through national borders through in-migration and out-migration, and understanding this flow may help explain some contradictions. With further data accumulating over the coming years, these apparently contradictory data may be seen as merely accurate 'still images' of a more subtle and complex dynamics of infection transmission.

CONCLUSION

A volume of data on HIV infection in MENA has become available in the last few years, although for a number of countries data remain limited. The key features of the epidemic gleaned from these novel data indicate growing, and in occasions, rapidly growing, HIV epidemics among key populations across the region. These findings are indicative of a rising HIV disease burden in this part of the globe, in contrast with the declining HIV epidemics in most other regions.

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Conflicts of interest

There are no conflicts of interest.

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