

NON-ALCOHOLIC FATTY LIVER DISEASE IN SUB-SAHARAN AFRICA AND MIDDLE EAST & NORTH AFRICA

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DISCLOSURES

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NAFLD GLOBAL PREVALENCE: 25%



AFRICAN AND MIDDLE EASTERN NAFLD PREVALENCE

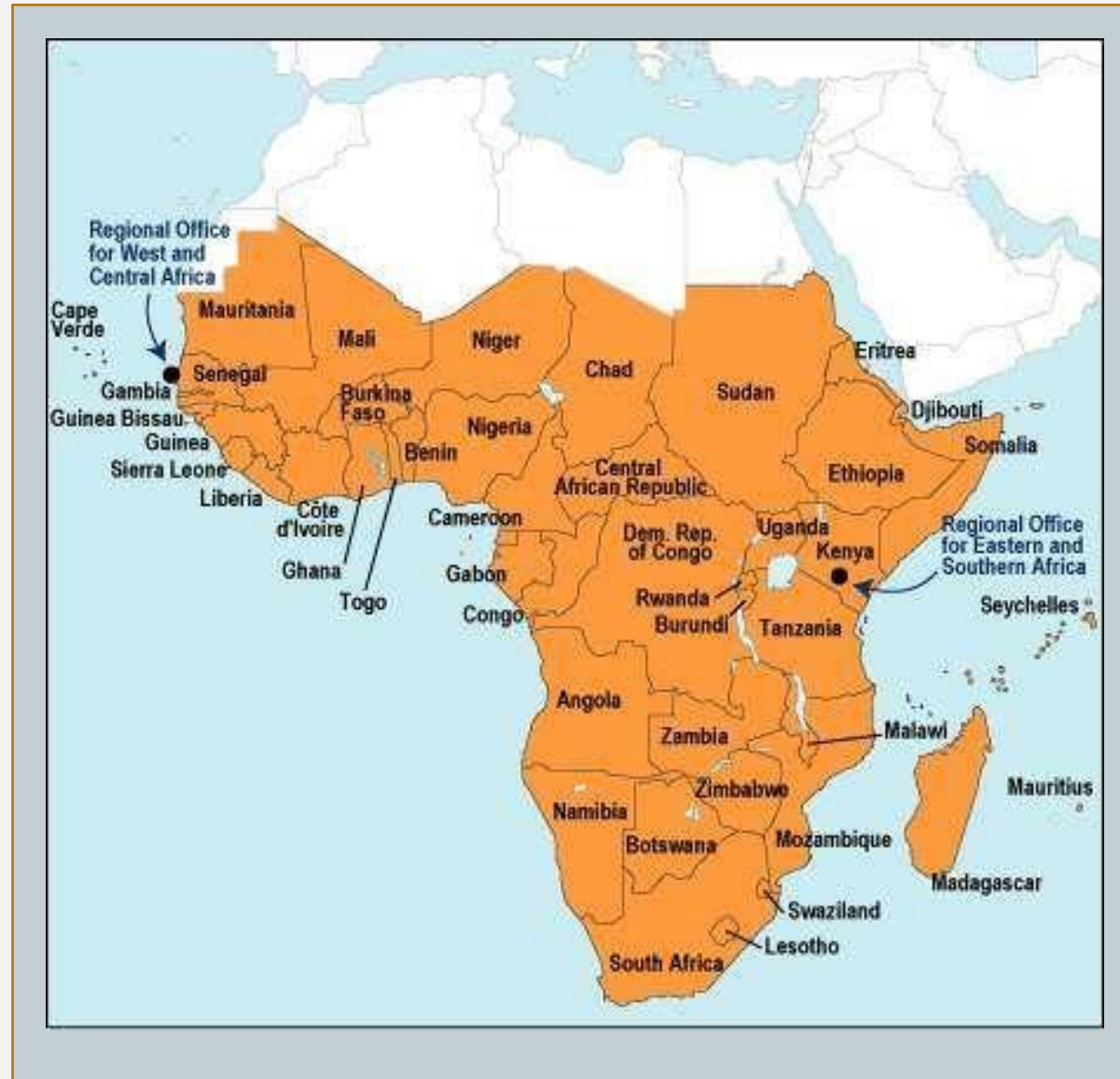


MIDDLE EAST AND NORTH AFRICA (MENA)



Per Global Burden of Disease (GBD), following countries make-up Middle East and north Africa: Afghanistan, Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, the occupied Palestinian territory, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, Turkey, United Arab Emirates, Yemen

SUB-SAHARAN AFRICA (SSA)



NON-COMMUNICABLE DISEASE (NCDs) PREVALENCE IN SSA AND MENA

- Rising prevalence of non-communicable disease (NCDs) across SSA & MENA including obesity, type 2 DM (T2DM) and metabolic syndrome (MetS)

Causes:

- Reduced morbidity and mortality from communicable diseases, improved control of HIV
- Many countries in SA and MENA region transiting from traditional to modern diet, with high processed food content
- Decreased physical activity from increasing urbanization
- Aging

NON-COMMUNICABLE DISEASE (NCDs) PREVALENCE IN MENA AND SSA

- Women in MENA have highest risk of metabolic diseases of all women globally and highest DALY 2/2 to metabolic disease, whereas men in MENA rank second of all men globally
- In SSA, mean BMI has increased significantly over the 3 decades from 1980 to 2014
 - Men: 21 kg/m² to 23.0 kg/m²
 - Women: 21.9 kg/m² to 24.9 kg/m²
- 2017 Global Burden of Disease (GBD) study in SSA
 - Increase in all-age total disability-adjusted life-years 2/2 NCDs increased by 67% from 18.6% to 29.8%

F Azziz et al., Lancet Diabetes Endocrinol 2019

NCD Risk Factor Collaboration (NCD-RisC)—Africa Working Group. Int J Epidemiol 2017

DIABETES PREVALENCE IN SSA

- Prevalence of DM rising across MENA and SSA
- In SSA from 1980- 2014, age standardized prevalence of diabetes increased
 - Men: 3.4% to 8.5%
 - Women: 4.1% to 8.9%
- From 2017 and 2045 SSA projected to have greatest global increase in DM from 16 million to 41 million people

DIABETES IN MENA

- The Middle East and North African countries considered to have high DM prevalence
- Study of 4,378 individuals in Africa and Middle East T2DM prevalence 25%
- Individual countries have high prevalence of T2DM
 - Kuwait 21.1%, Lebanon 20.2%, Qatar 20.2%, Saudi Arabia 20.0%, Bahrain 19.9%, UAE 19.2% Sudan 19.1%

METABOLIC DISEASE IN MENA AND SSA

No.	Country	Diabetes	Obesity	Metabolic syndrome
1	South Africa	7%	29.9%	23.3%
2	Ethiopia	8.9%	20%	12.5%
3	Egypt	14.9%	70%	7.4%
4	Ghana	1.9%	58%	35.9%
5	Saudi	17.6%	23.6%	28%
6	Iran	8.7%	14.2%	30.1%
7	Yemen	9.75%	8.8%	46%
8	Pakistan	16.68%	22.2%	46%
9	Jordan	17.1%	34.8%	37.4%
10	Kuwait	21.1%	78.4	32.8%
11	Nigeria	1.9%	15%	12.1%
12	Uganda	2.5%	2.3%	58%
13	Kenya	3.3%	8.9%	34.6%
14	Botswana	3.9%	12.7%	11%
15	United Republic of Tanzania	3.5%	19.2%	30%

NAFLD PREVALENCE IN NON-DM IN SSA

- Meta-analysis from 2016: NAFLD prevalence of 13.5% ranging 9% Nigeria (ultrasound) to 20% Sudan (ultrasound)
- **Data from more recent studies remains limited by small study size & use of ultrasound to define NAFLD; lack of NITs to identify fibrosis**
- Ghana: 88 premenopausal and 97 postmenopausal women
 - NAFLD prevalence of 40% (defined by Fatty Liver Index)
 - Post-menopausal NAFLD: 49.48%, vs. pre-menopausal women 29.55%
- Ghana: 97 hospitalized patients, NAFLD evaluated by US, 56% had NAFLD; associated with increased length of stay

Z. Younossi et al., *Hepatology* 2016

CA Onyekwere et al., *Ann Hepatol* 2011

C Ahoui-Apendi et al., *Open J Gastroenterol* 2020

AM Setroame AM et al., *BioMed Res Int* 2020

A Ssentongo et al. *Current Developments in Nutrition* 2020

NAFLD PREVALENCE IN PREVALENCE IN NON-DM IN SSA

In urban-based individuals with metabolic syndrome, high NAFLD prevalence have been documented: 37.2% in Burundi (N=102, ultrasound) and 38.7% in Congo (N=124, ultrasound)

Biopsy study from South Africa in 127 adults with overweight or obesity; 48% prevalence of NAFLD; 36% NASH, 11% advanced fibrosis

C Ahoui-Apendi et al., *Open J Gastroenterol* 2020

AM Setroame AM et al., *BioMed Res Int* 2020

A Ssentongo et al. *Current Developments in Nutrition* 2020

NALFD PREVALENCE IN NON-DM IN SSA: OVERALL

NAFLD Prevalence estimates range from 9% (Nigeria) – 56% (Ghana)

NASH prevalence very limited, 36% of those with NAFLD and advanced fibrosis in 11% of those with NAFLD

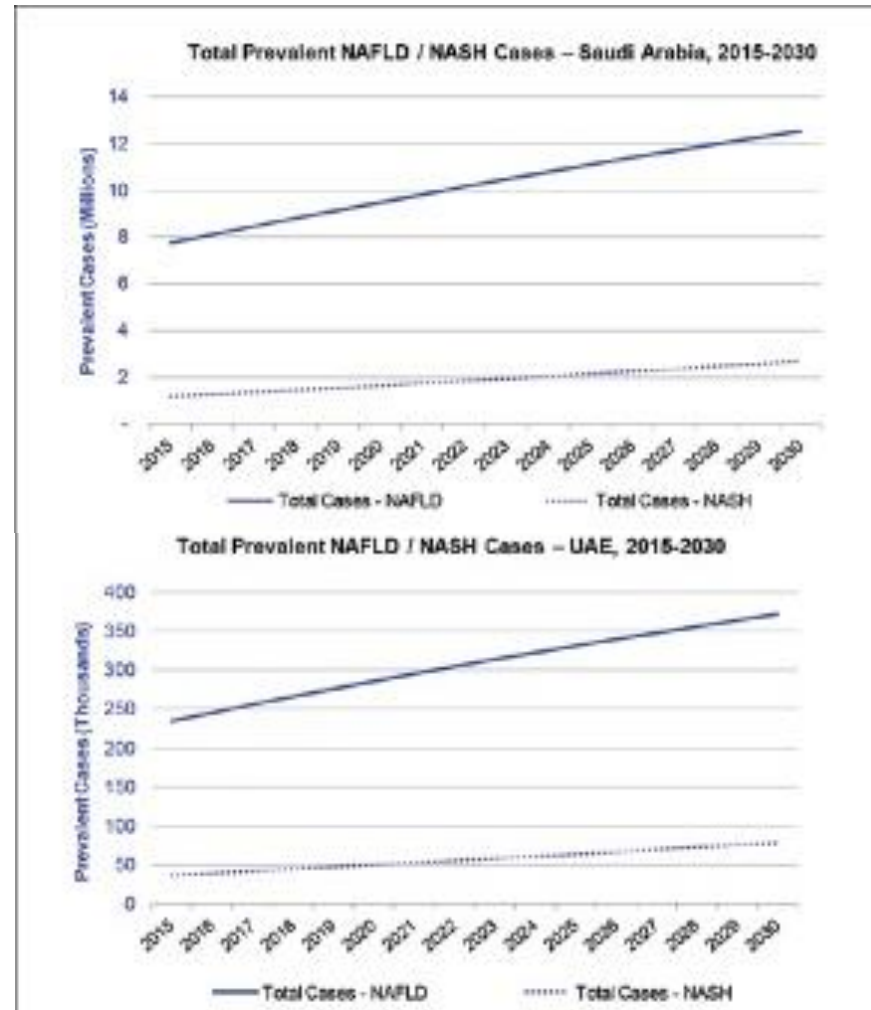
C Ahoui-Apendi et al., *Open J Gastroenterol* 2020

AM Setroame AM et al., *BioMed Res Int* 2020

A Ssentongo et al. *Current Developments in Nutrition* 2020

NAFLD IN NON-DM IN MENA

- The prevalence of NAFLD is high across the ME varying from 16.6% to 43.8%
- Kuwait 33.3% (n=143 adults, US)
- South Iran 21.5% (N=819, US)
- North Iran 43.8% (N=6583, presumed NASH: elevated ALT, alcohol, HBV and HCV excluded)
- Saudi Arabia 16.6% - 24.8% (estimated, Markov Model)
- UAE: 23.7% (estimated, Markov Model)

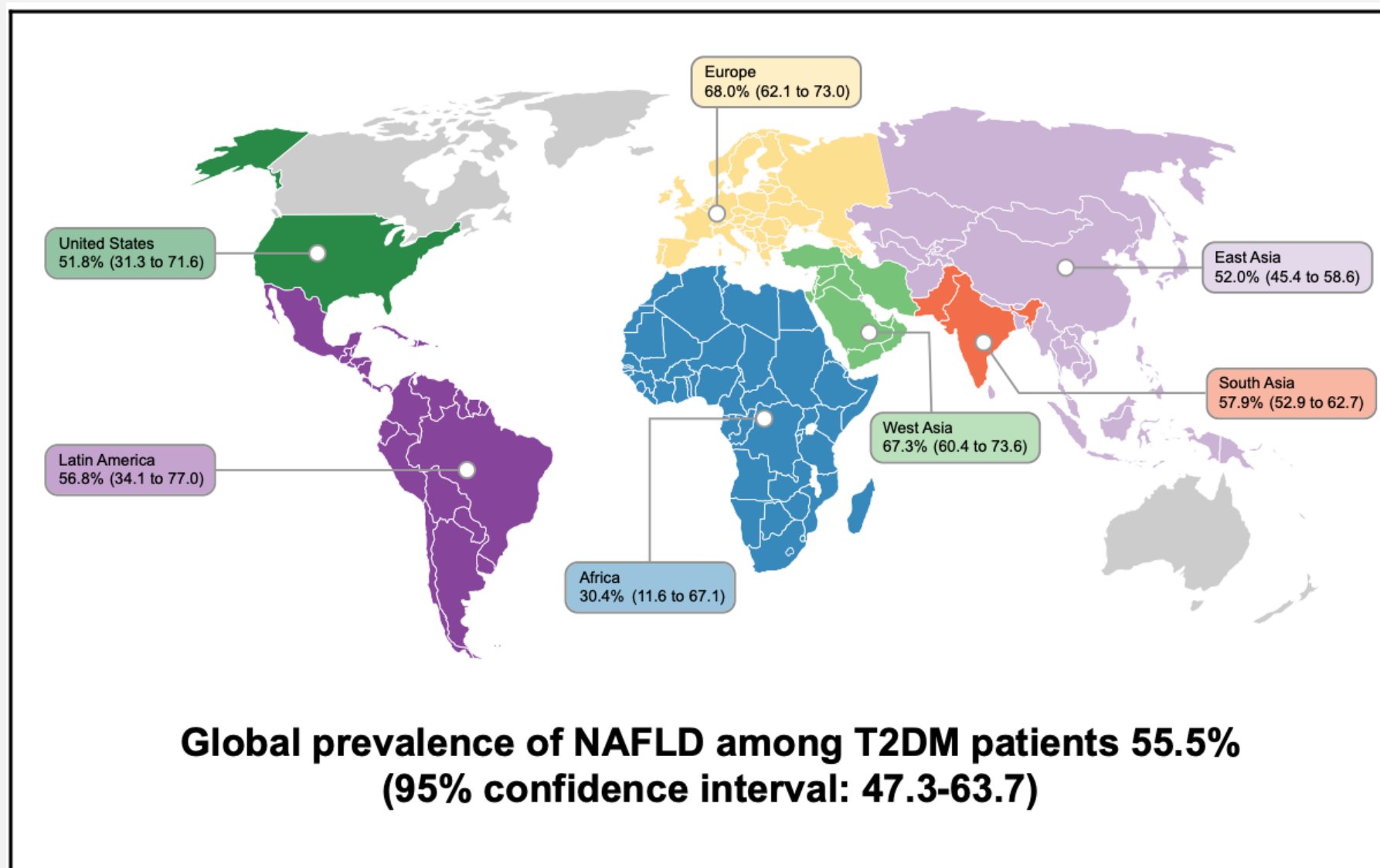


M Ramezani-Binabaj et al., Hepat Mon. 2014
K Bagheri Lankarani et al. Hep Mon 2013
A Sohrabpour et al., Middle East J Dig Dis. 2010
P Babusik et al. Medical Principles and Practice 2012

PREVALENCE OF NAFLD IN MENA

Table 1. The Prevalence of NAFLD in Some African and Middle East Countries [37, 39-43, 48]

Country	Prevalence rate (%)	Comment(s)	Authors
South Africa	47.6	Among overweight/obese subjects	Kruger et al [37]
Nigeria	8.7	Population-based	Onyekwere et al [39]
Kuwait	33.3		Ramezani et al [40]
Iran	33.9	Meta-analysis	Sohrabpour et al [41]
Sudan	20	Among non-diabetic	Almobarak et al [42]
Sudan	50	Among diabetic patients	Almobarak et al [43]
Egypt	15.8	Among school children	Alkassabany et al [48]



NAFLD PREVALENCE IN DM IN SSA

- NAFLD prevalence in patients with type 2 diabetes in Africa, based on four studies, was 30.4%
- In Nigeria, NAFLD prevalence 9.5–16.7% in people with type 2 diabetes
- In southeast Ethiopia, prevalence of NAFLD of 73% (70 of 96 people) in type 2 diabetes.

NAFLD PREVALENCE AMONG THOSE WITH T2DM

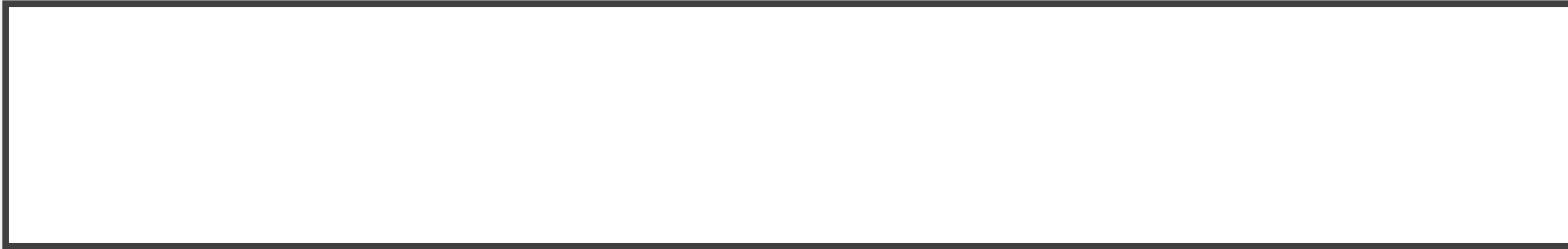
West Asia: Iran, Saudi Arabia, Turkey

Table 2. NAFLD prevalence among patients with T2DM, stratified by age, obesity, diagnostic method, and region.

	Studies, n	Prevalence % (95% CI)	I ²
Global*	80	55.48 (47.26–63.67)	
Age, years			
<50	5	56.45 (46.91–65.52)	80.51
50–59	38	56.46 (49.87–62.79)	98.97
≥60	33	62.83 (58.12–67.30)	97.36
Obesity ¹			
Overweight	48	57.71 (53.48–61.83)	98.47
Obese	22	64.36 (55.11–72.65)	97.57
Diagnose method			
H-MRS	6	60.38 (52.57–67.69)	79.81
Ultrasound	74	59.21 (55.15–63.13)	98.60
Region ²			
Overall	80	59.25 (55.47–62.92)	98.42
USA	3	51.77 (31.33–71.64)	96.10
Latin America	3	56.96 (40.07–72.37)	84.85
Europe	26	71.74 (67.84–75.33)	94.68
East Asia	34	52.89 (48.60–57.15)	98.16
South Asia	6	58.10 (54.49–61.63)	7.25
West Asia	4	61.60 (38.51–80.43)	95.81
Africa	4	31.95 (10.63–64.95)	97.53
Publication, year			
<2014	38	57.52 (52.58–62.32)	96.93
≥2014	42	60.88 (55.22–66.26)	98.94
Sample Size			
<200 participants	33	56.74 (50.51–62.76)	91.90
≥200 participants	47	60.84 (56.08–65.40)	98.97

TAKE AWAY POINTS

- Non-communicable diseases including obesity and type 2 diabetes are growing rapidly in Sub-Saharan African and the Middle East/North Africa
- NAFLD being increasingly recognized across SSA and MENA
- Current data is largely limited to use of ultrasounds to identify NAFLD and non-invasive testing for fibrosis staging is limited
- Future studies should focus on identification of scalable, low cost NITs; identification of novel risk factors and confirmation of known risk factors and community-based lifestyle interventions



- DM is a current challenge for most health authorities in Africa and Middle East. For instance, the prevalence of DM in Iraq was estimated to be around 9.33% while in Kuwait it was estimated to be around 21.1% [65, 66]. We have shown that the prevalence of undiagnosed diabetes in rural communities of north Sudan was 2.6% and the prevalence of impaired glucose tolerance was 1.6%. We identified increasing age and obesity as important risk factors [67]. Furthermore, we have also shown that in urban community in Sudan, the prevalence of diabetes is estimated to be around 19.1% [68]. This prevalence is almost similar to prevalence of diabetes in Iran (18%) but higher than Ethiopia where the prevalence was 5.1% [69, 70]. The Middle East and North African countries are regarded as highly prevalent countries with diabetes. For instance, in epidemiological study in 4,378 individuals in Africa and Middle East (AfME-14 countries) region, the prevalence of diabetes was shown to be 25% [71]. Importantly, several countries in these regions have diabetes prevalence of more than 18%, like Kuwait (21.1%), Lebanon (20.2%), Qatar (20.2%), Saudi Arabia (20.0), Bahrain (19.9%) UAE (19.2%) and Sudan (19.1%) [65]. The increase in DM prevalence has been attributed to increasing urbanization, aging

NALFD PREVALENCE IN SSA

- Meta-analysis from 2016: NAFLD prevalence of 13.5% ranging 9% Nigeria to 20% Sudan
- In Nigeria, NAFLD was assessed by ultrasound in 150 subjects
 - Overall prevalence of NAFLD: 8.7%
 - Prevalence rate of NAFLD higher in DM cases than control subjects but not statistically significant (9.5 vs. 4.5%, $p = 0.2$)

48,49 A Ghanaian cross-sectional study of 88 premenopausal and 97 postmenopausal women⁵⁰ revealed an overall prevalence of metabolic syndrome of 25% (46 of 185 women) and NAFLD prevalence of 40% (74 of 185 women).

In urban-based individuals with metabolic syndrome, high NAFLD prevalences have been documented: 37.2% in Burundi and 38.7% in Congo (Brazzaville).^{52,53}

Z. Younossi et al., Hepatology 2016

CA Onyekwere et al., Ann Hepatol 2011

C Ahoui-Apendi et al., Open J Gastroenterol 2020