

Table 1. Studies examining effects of early life famine exposure on NCD outcomes by study design

Study	Country and population	Exposure age group in years (sample size)	Outcome(s)	Key findings*	Risk of bias score (IV/EV)†
<b>Retrospective cohort studies</b>					
Chen <i>et al</i> 2019 <sup>31</sup>	China, adults > 40y	0–9y (n=1799) 10–37y (n=1064)	Visceral adipose dysfunction (VAD)	↑ VAD (women 0–9y)	● / ●
Finer <i>et al</i> 2016 <sup>21</sup>	Bangladesh, adults ~30y	1–2y (n=81)	Glucose tolerance, epigenetics	↔ Glucose tolerance ↓ Epigenetics	● / ●
Head <i>et al</i> 2008 <sup>22</sup>	England, adults ~70y	8–22y (n=225)	Cardiovascular disease (CVD)	↑ CVD	- / -
Head <i>et al</i> 2009 <sup>32</sup>	England, adults ~70y	8–22y (n=87)	Cholesterol levels	↔ Cholesterol levels	- / -
Huang <i>et al</i> 2010 <sup>33</sup>	China, women ~50y	0–1.5y (n=1035) 1.5–2.5y (n=743)	Hypertension, body mass index (BMI)	↑ Hypertension (0–1.5y) ↑ BMI (1.5–2.5y)	● / ●
Idris <i>et al</i> 2013 <sup>29</sup>	Netherlands, women ~70y	0–9y (n=93) 10–18y (n=54)	Coronary artery calcifications, valve calcification	↑ Coronary calcium score (10–18y) ↔ Valve calcification	● / -
Li, Y <i>et al</i> 2010 <sup>34</sup>	China, adults ~45y	0–2y (n=1654) 3–5y (n=1588) 6–8y (n=1673)	Hyperglycemia, type 2 diabetes (T2D)	↑ Fasting plasma glucose ↑ Hyperglycemia (6–8y)	● / ●
Li, Y <i>et al</i> 2011 <sup>35</sup>	China, adults ~45y	0–2y (n=1654) 3–5y (n=1588) 6–8y (n=1673)	Metabolic syndrome (MetS)	↑ MetS (0–2y)	● / ●
Liu, L <i>et al</i> 2017 <sup>19</sup>	China, adults 35–74y	0–9y (n=n/r) 10–17y (n=n/r)	Obesity	↑ Obesity	- / ●
Liu, L <i>et al</i> 2017 <sup>36</sup>	China, adults 45–53y	0–3y (n=455)	Hypertension	↔ Hypertension	- / -
Portrait <i>et al</i> 2011 <sup>37</sup>	Netherlands, adults 60–76y	0–1y (n=81) 1–5y (n=293) 6–10y (n=244) 11–14y (n=181)	Heart diseases, peripheral arterial diseases (PAD), T2D	↑ T2D, PAD (women, 11–14y)	● / ●
Rotar <i>et al</i> 2017 <sup>38</sup>	Russia, adults 64–81y	0–1y (n=50) 1–10y (n=210)	Cardiovascular health, telomere length	↔ CVD, organ damage ↓ Telomere length	● / -
Shi <i>et al</i> 2018 <sup>39</sup>	China, adults ~55y	0–2y (n=1149) 3–5y (n=1217) 6–8y (n=1250)	CVD	↑ CVD (with hypertension and famine exposure)	● / ●
Wang, J <i>et al</i> 2016 <sup>40</sup>	China, adults ~60y	1–3y (n=1932) 3–5y (n=1712) 5–7y (n=1953)	T2D, hyperglycemia	↑ T2D, hyperglycemia (women 3–5y, 5–7y)	● / -
Wang, N <i>et al</i> 2015 <sup>41</sup>	China, adults 52–93y	0–9y (n=1911) 10–37y (n=1188)	T2D	↑ T2D (women, 0–9y)	● / ●●
Wang, N <i>et al</i> 2016 <sup>42</sup>	China, adults 52–93y	0–9y (n=1778) 10–37y (n=1076)	Non-alcoholic fatty liver disease (NAFLD)	↑ NAFLD (women, 0–9y)	● / ●●
Wang, N <i>et al</i> 2017 <sup>43</sup>	China, adults 52–77y	0–9y (n=1140) 10–33y (n=706)	T2D	↑ T2D (0–9y)	● / ●●
Wang, N <i>et al</i> 2017 <sup>44</sup>	China, adults 52–93y	0–9y (n=1776) 10–37y (n=1053)	MetS	↑ MetS (women, 0–9y)	● / ●●
Wang, N <i>et al</i> 2018 <sup>45</sup>	China, women 52–93y	0–9y (n=1679) 10–37y (n=1003)	Chronic kidney disease (CKD)	↔ CKD	● / ●●
Wang, P <i>et al</i> 2012 <sup>46</sup>	China, adults ~50y	0–2y (n=3126)	Hypertension, obesity	↑ Hypertension ↔ Obesity	● / ●●
Wang, Y <i>et al</i> 2010 <sup>46</sup>	China, adults ~50y	1–3y (n=4,563)	Overweight, obesity	↑ Weight/BMI (women) ↑ Obesity (women)	- / -
Wang, Z <i>et al</i> 2016 <sup>47</sup>	China, adults ~50y	0–1y (n=338) 2–6y (n=457)	Hypertension	↑ Hypertension (0–1y)	● / ●
Wang, Z <i>et al</i> 2017 <sup>48</sup>	China, adults ~50y	0–1y (n=536) 2–6y (n=597)	Dyslipidemia	↑ Low-density lipoprotein cholesterol (women)	- / ●

Wang, Z <i>et al</i> 2019 <sup>49</sup>	China, adults ~50y	0–1y (n=269) 2–6y (n=717)	MetS	↑ MetS (0–1y)	- / ●
Xin 2019 <sup>50</sup> <i>et al</i>	China, adults, ~60y	3–12y (n=2132) 13–20y (n=1140)	Dyslipidemia	↑ Dyslipidemia	- / -
Yao <i>et al</i> 2019 <sup>51</sup>	China, adults, ~60y	2–4y (n=206)	Dyslipidemia	↔ Dyslipidemia	- / -
Yu, C <i>et al</i> 2017 <sup>52</sup>	China, adults ~60y	0–3y (n=2115) 3–5y (n=1941) 5–7y (n= 2248)	Hypertension	↑ Hypertension	● / -
Yu, C <i>et al</i> 2018 <sup>53</sup>	China, adults ~60y	0–3y (n=1940) 3–5y (n=1741) 5–7y (n=2010)	MetS	↑ MetS (women)	● / -
Zheng, X <i>et al</i> 2011 <sup>54</sup>	China, adults ~55y	0–2y (n=1344)	MetS	↑ MetS (women)	● / -
Zheng, X <i>et al</i> 2017 <sup>55</sup>	China, women ~55y	0–2y (n=2403)	NAFLD	↑ NAFLD	● / -
Zheng, X <i>et al</i> 2019 <sup>56</sup>	China, adults ~55y	0–2y (n=95)	Thyroid function	↓ Free thyroxine ↑ Thyroid stimulating hormone	- / -
<b>Prospective cohort studies</b>					
Hult <i>et al</i> 2010 <sup>17</sup>	Nigeria, adults ~40y	0–3y (n=246)	Hypertension, glucose tolerance, BMI	↑ Blood pressure ↔ Glucose tolerance, BMI	● / -
Meng <i>et al</i> 2018 <sup>57</sup>	China, adults ~45y	1–3y (n=31,363)	T2D, obesity	↔ T2D, obesity ↓ Abdominal obesity	● / ●
Sparen <i>et al</i> 2014 <sup>58</sup>	Russia, men 64–83y	6–8y, 9–15y, 16–26y (total n=1406)	CVD risk factors and mortality	↑ Blood pressure (9–15y) ↑ Ischaemic heart disease mortality, stroke (9–15y)	●● / ●
Sun <i>et al</i> 2018 <sup>59</sup>	China, adults ~55y	1–3y (n=1297) 4–6y (n=1476) 7–10y (n=1499)	Hyperglycemia, T2D	↑ Hyperglycemia (women) ↓ T2D (men 1–3y, 7–10y)	- / -
Vaiserman <i>et al</i> 2013 <sup>18</sup>	Ukraine, adults ~70y	0–3y (n=n/r)	T2D	↔ T2D	● / ●
van Abeelen <i>et al</i> 2012 <sup>27</sup>	Netherlands, women 49–70y	0–9y (n=n/r) 10–17y (n=n/r)	T2D	↑ T2D (0–9y)	● / ●
van Abeelen <i>et al</i> 2012 <sup>28</sup>	Netherlands, women 49–70y	0–9y (n=2196) 10–17y (n=1773)	Coronary heart disease (CHD), stroke	↑ CHD (10–17y) ↓ Stroke	● / ●
<b>Cross-sectional studies</b>					
Khalangot <i>et al</i> 2017 <sup>26</sup>	Ukraine, adults > 44y	Age in childhood n/s (n=62)	Glucose tolerance	↓ T2D	● / ●
Koupil <i>et al</i> 2007 <sup>60</sup>	Russia, adults 40–70y	1–5y (n=81) 6–8y (n=287) 9–15y (n=739) 16–25y (n=813)	CVD risk factors and mortality	↑ Hypertension (men 6–25y) ↑ Ischaemic heart disease mortality (men 6–8y) ↑ Cerebrovascular disease mortality (men 9–15y)	● / ●
Woo <i>et al</i> 2010 <sup>30</sup>	China, adults > 65y	Age in childhood n/s (n=2222)	NCDs, blood pressure, BMI	↑ BMI, myocardial infarction ↔ T2D, hypertension	● / -
Zhang <i>et al</i> 2018 <sup>61</sup>	China, adults ~55y	0–3y (n=1582)	Hyperglycemia, T2D	↑ Hyperglycemia (women)	● / ●
Zhou <i>et al</i> 2019 <sup>62</sup>	China, adults 45–60y	0–2y (n=160) 3–5y (n=173) 6–8y (n=141)	NCDs	↑ T2D (0–2y, 3–5y) ↑ Hypercholesterolaemia (0–2y)	- / -

\* Symbols for effect direction: ↑ increased; ↓ decreased; ↕ mixed (indicate statistically significant results were reported, defined as p < 0.05); ↔ none (indicates no statistically significant result was reported). If no age group is indicated beside the finding, then all age groups were affected.

† The scoring system used in the risk of bias assessment is described in the methods section.

Abbreviations: Body mass index (BMI), cardiovascular disease (CVD), chronic kidney disease (CKD), coronary heart disease (CHD), metabolic syndrome (MetS), non-alcoholic fatty liver disease (NAFLD), n/r (not reported), n/s (not specified), peripheral arterial diseases (PAD), type 2 diabetes (T2D), visceral adipose dysfunction (VAD)