

## Supplementary Material

### The Epidemiology of Palmoplantar Pustulosis: An Analysis of Multiple Health Insurance Claims and Electronic Health Records Databases

**Supplementary Information Table 1. Prevalence per 100,000 population using the specific PPP definition by database, year, and sex (all ages)**

	Database	Year	Males	Females	Overall
<b>Japan</b>	JMDC	2016	46.65 (44.25–49.14)	58.83 (55.86–61.92)	52.14 (50.26–54.09)
		2017	51.91 (49.58–54.33)	68.00 (65.10–71.00)	59.30 (57.46–61.19)
		2018	59.24 (56.87–61.67)	81.66 (78.62–84.78)	69.46 (67.56–71.39)
		2019	67.38 (64.93–69.90)	94.57 (91.40–97.81)	79.81 (77.84–81.81)
		2020	75.57 (73.01–78.21)	105.36 (102.09–108.71)	89.35 (87.29–91.44)
<b>US</b>	Optum EHR	2016	1.12 (0.97–1.29)	2.67 (2.46–2.89)	1.99 (1.86–2.13)
		2017	1.63 (1.44–1.84)	4.20 (3.93–4.48)	3.08 (2.91–3.26)
		2018	2.49 (2.23–2.76)	6.24 (5.88–6.61)	4.60 (4.37–4.84)
		2019	3.31 (2.99–3.65)	8.19 (7.75–8.65)	6.08 (5.79–6.38)
		2020	4.76 (4.29–5.27)	11.58 (10.95–12.25)	8.68 (8.26–9.12)
	Optum SES	2016	1.63 (1.35–1.95)	3.45 (3.05–3.89)	2.56 (2.32–2.83)
		2017	2.30 (1.98–2.66)	5.56 (5.07–6.09)	3.98 (3.68–4.29)
		2018	2.92 (2.56–3.31)	7.05 (6.50–7.63)	5.04 (4.70–5.39)
		2019	3.63 (3.23–4.07)	8.88 (8.27–9.53)	6.34 (5.96–6.73)
		2020	4.20 (3.76–4.68)	10.41 (9.74–11.12)	7.43 (7.01–7.86)
	CCAE	2016	1.79 (1.55–2.06)	4.59 (4.21–5.00)	3.24 (3.01–3.49)
		2017	2.61 (2.30–2.94)	6.05 (5.60–6.53)	4.39 (4.11–4.68)
		2018	2.93 (2.61–3.27)	6.78 (6.31–7.29)	4.90 (4.61–5.21)
		2019	3.49 (3.13–3.88)	8.38 (7.83–8.96)	5.99 (5.66–6.34)
		2020	3.76 (3.38–4.18)	8.93 (8.35–9.55)	6.41 (6.05–6.78)
	MDCD	2016	0.84 (0.60–1.13)	2.39 (2.03–2.80)	1.72 (1.49–1.98)
		2017	1.40 (1.09–1.77)	4.04 (3.57–4.56)	2.90 (2.60–3.23)
		2018	1.88 (1.49–2.34)	5.68 (5.07–6.34)	4.04 (3.66–4.46)
		2019	2.04 (1.65–2.49)	6.04 (5.44–6.68)	4.30 (3.92–4.71)
		2020	2.16 (1.77–2.61)	6.13 (5.54–6.77)	4.40 (4.02–4.81)
MDCR <sup>a</sup>	2016	5.11 (3.68–6.90)	7.96 (6.32–9.89)	6.68 (5.56–7.98)	
	2017	8.03 (5.90–10.68)	11.61 (9.24–14.41)	9.99 (8.34–11.87)	
	2018	7.28 (5.01–10.22)	10.39 (7.91–13.40)	9.01 (7.26–11.05)	
	2019	8.04 (5.50–11.35)	14.56 (11.41–18.30)	11.67 (9.55–14.13)	
	2020	4.46 (2.89–6.59)	11.27 (8.88–14.11)	8.18 (6.66–9.94)	

<sup>a</sup>Medicare eligibility is mostly restricted to adults ≥65 years of age.

PPP=palmoplantar pustulosis; JMDC=Japan Medical Data Center; EHR=Optum® de-identified Electronic Health Record Database; SES=Optum's Clinformatics® de-identified Data Mart Database; CCAE=IBM®MarketScan® Commercial Database; MDCD=IBM®MarketScan® Multi-State Medicaid Database; MDCR=IBM®MarketScan® Medicare Supplemental Database.

**Supplementary Information Table 2. Prevalence per 100,000 population using the specific PPP definition among patients  $\leq 2$  years of age by database, year, and sex**

	Database	Year	Males	Females	Overall
<b>Japan</b>	JMDC	2016	0	2.21 (0.27–7.99)	1.08 (0.13–3.89)
		2017	1.80 (0.22–6.50)	0.95 (0.02–5.31)	1.39 (0.29–4.06)
		2018	3.31 (0.90–8.48)	2.62 (0.54–7.65)	2.97 (1.20–6.13)
		2019	2.45 (0.51–7.16)	3.43 (0.93–8.77)	2.93 (1.18–6.03)
		2020	1.65 (0.20–5.98)	3.46 (0.94–8.85)	2.54 (0.93–5.52)
<b>US</b>	Optum EHR	2016	0.36 (0.04–1.29)	0.39 (0.05–1.41)	0.37 (0.10–0.96)
		2017	0.39 (0.05–1.41)	0	0.20 (0.02–0.74)
		2018	0.50 (0.06–1.81)	0	0.26 (0.03–0.95)
		2019	1.14 (0.31–2.92)	0	0.60 (0.16–1.53)
		2020	1.35 (0.28–3.95)	0	0.70 (0.15–2.06)
	Optum SES	2016	0	0	0
		2017	0.64 (0.02–3.56)	0	0.33 (0.01–1.83)
		2018	0	0	0
		2019	0	0	0
		2020	0.76 (0.02–4.23)	0	0.39 (0.01–2.17)
	CCAIE	2016	0.33 (0.01–1.84)	0.35 (0.01–1.93)	0.34 (0.04–1.22)
		2017	0.35 (0.01–1.93)	0.73 (0.09–2.64)	0.53 (0.11–1.56)
		2018	0.69 (0.08–2.51)	0	0.36 (0.04–1.28)
		2019	0.38 (0.01–2.11)	0.39 (0.01–2.20)	0.39 (0.05–1.39)
		2020	0	0	0
	MDCD	2016	0.46 (0.06–1.66)	0.97 (0.26–2.47)	0.71 (0.26–1.54)
		2017	0.23 (0.01–1.29)	0.49 (0.06–1.76)	0.36 (0.07–1.04)
		2018	0.56 (0.07–2.01)	0.29 (0.01–1.64)	0.43 (0.09–1.26)
		2019	1.05 (0.29–2.70)	0	0.54 (0.15–1.38)
		2020	1.33 (0.43–3.11)	0.28 (0.01–1.56)	0.82 (0.30–1.78)

PPP=palmoplantar pustulosis; JMDC=Japan Medical Data Center; EHR=Optum® de-identified Electronic Health Record Database; SES=Optum’s Clinformatics® de-identified Data Mart Database; CCAIE=IBM® MarketScan® Commercial Database; MDCD=IBM®MarketScan® Multi-State Medicaid Database; MDCR=IBM® MarketScan® Medicare Supplemental Database.

**Supplementary Information Table 3. Prevalence per 100,000 population using the specific PPP definition among patients ≤11 year of age by database, year, and sex**

	Database	Year	Males	Females	Overall
<b>Japan</b>	JMDC	2016	9.29 (6.64–12.66)	6.37 (4.16–9.34)	7.87 (6.09–10.02)
		2017	10.50 (7.87–13.74)	8.79 (6.33–11.88)	9.67 (7.82–11.82)
		2018	10.70 (8.17–13.78)	12.61 (9.77–16.01)	11.63 (9.69–13.84)
		2019	12.16 (9.49–15.33)	12.27 (9.53–15.56)	12.21 (10.27–14.42)
		2020	13.88 (11.04–17.23)	15.16 (12.11–18.75)	14.51 (12.39–16.88)
<b>US</b>	Optum EHR	2016	0.36 (0.17–0.69)	0.26 (0.10–0.57)	0.31 (0.18–0.52)
		2017	0.53 (0.27–0.93)	0.43 (0.20–0.82)	0.48 (0.30–0.74)
		2018	0.68 (0.35–1.18)	0.55 (0.25–1.04)	0.62 (0.38–0.94)
		2019	1.16 (0.68–1.86)	0.52 (0.21–1.07)	0.85 (0.55–1.27)
		2020	1.76 (0.98–2.90)	0.76 (0.28–1.66)	1.28 (0.79–1.96)
	Optum SES	2016	0.13 (0.00–0.73)	0.14 (0.00–0.76)	0.13 (0.02–0.48)
		2017	0.13 (0.00–0.70)	0.13 (0.00–0.74)	0.13 (0.02–0.47)
		2018	0.13 (0.00–0.72)	0.14 (0.00–0.76)	0.13 (0.02–0.48)
		2019	0.54 (0.15–1.38)	0.42 (0.09–1.24)	0.48 (0.19–1.00)
		2020	0.74 (0.24–1.73)	0.16 (0.00–0.87)	0.46 (0.17–0.99)
	CCAE	2016	0.38 (0.14–0.83)	0.40 (0.15–0.86)	0.39 (0.20–0.68)
		2017	0.47 (0.19–0.96)	0.56 (0.24–1.10)	0.51 (0.29–0.84)
		2018	0.60 (0.28–1.14)	0.42 (0.15–0.91)	0.51 (0.29–0.85)
		2019	0.65 (0.30–1.23)	0.60 (0.26–1.19)	0.63 (0.37–1.00)
		2020	0.61 (0.26–1.21)	0.32 (0.09–0.82)	0.47 (0.24–0.82)
	MDCD	2016	0.15 (0.03–0.45)	0.38 (0.15–0.78)	0.26 (0.13–0.49)
		2017	0.26 (0.08–0.60)	0.60 (0.30–1.07)	0.42 (0.24–0.69)
		2018	0.19 (0.04–0.54)	0.73 (0.36–1.30)	0.45 (0.25–0.75)
		2019	0.29 (0.09–0.67)	0.92 (0.51–1.51)	0.59 (0.36–0.92)
		2020	0.41 (0.16–0.83)	0.74 (0.38–1.29)	0.57 (0.34–0.88)

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**Supplementary Information Table 4. Prevalence per 100,000 population using the specific PPP definition among patients 12–17 years of age by database, year, and sex**

	Database	Year	Males	Females	Overall
<b>Japan</b>	JMDC	2016	13.22 (8.92–18.87)	13.89 (9.37–19.83)	13.55 (10.34–17.44)
		2017	16.92 (12.34–22.64)	18.19 (13.32–24.26)	17.54 (14.12–21.53)
		2018	21.39 (16.44–27.37)	19.98 (15.09–25.94)	20.70 (17.15–24.77)
		2019	26.09 (20.72–32.43)	25.42 (20.00–31.86)	25.77 (21.88–30.14)
		2020	27.54 (22.06–33.97)	26.94 (21.40–33.49)	27.25 (23.29–31.70)
<b>US</b>	Optum EHR	2016	0	0.59 (0.26–1.16)	0.30 (0.13–0.59)
		2017	0.17 (0.02–0.60)	1.12 (0.61–1.89)	0.66 (0.37–1.06)
		2018	0.31 (0.06–0.91)	1.49 (0.84–2.46)	0.91 (0.54–1.44)
		2019	0.63 (0.20–1.47)	1.93 (1.11–3.14)	1.29 (0.80–1.98)
		2020	1.92 (0.88–3.64)	2.80 (1.53–4.70)	2.37 (1.51–3.56)
	Optum SES	2016	0	0.46 (0.06–1.67)	0.23 (0.03–0.82)
		2017	0.21 (0.01–1.19)	0.88 (0.24–2.26)	0.54 (0.18–1.26)
		2018	0.44 (0.05–1.58)	0.68 (0.14–1.99)	0.56 (0.18–1.30)
		2019	1.13 (0.37–2.63)	0.94 (0.26–2.40)	1.03 (0.47–1.96)
		2020	1.22 (0.40–2.85)	2.03 (0.88–4.00)	1.62 (0.86–2.77)
	CCAIE	2016	0.40 (0.11–1.01)	0.21 (0.02–0.74)	0.30 (0.11–0.66)
		2017	0.84 (0.36–1.65)	0.43 (0.12–1.11)	0.64 (0.33–1.11)
		2018	0.73 (0.29–1.51)	0.98 (0.45–1.86)	0.85 (0.49–1.39)
		2019	0.67 (0.25–1.46)	1.51 (0.80–2.58)	1.08 (0.65–1.69)
		2020	0.71 (0.26–1.54)	0.86 (0.34–1.77)	0.78 (0.42–1.34)
	MDCD	2016	0.11 (0.00–0.64)	0.24 (0.03–0.88)	0.18 (0.04–0.51)
		2017	0.45 (0.12–1.16)	0.72 (0.26–1.57)	0.58 (0.28–1.07)
		2018	0.53 (0.15–1.37)	0.71 (0.23–1.66)	0.62 (0.28–1.17)
		2019	0.84 (0.34–1.73)	0.64 (0.21–1.49)	0.74 (0.38–1.30)
		2020	1.16 (0.56–2.13)	0.86 (0.35–1.77)	1.01 (0.59–1.62)

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**Supplementary Information Table 5. Prevalence per 100,000 population using the specific PPP definition among adults  $\geq 18$  years of age by database, year, and sex**

	Database	Year	Males	Females	Overall
<b>Japan</b>	JMDC	2016	56.63 (53.64–59.74)	75.52 (71.62–79.57)	64.95 (62.54–67.42)
		2017	62.70 (59.80–65.71)	85.76 (82.02–89.62)	73.11 (70.78–75.49)
		2018	71.46 (68.53–74.48)	102.97 (99.06–107.00)	85.54 (83.15–87.98)
		2019	80.88 (77.86–83.98)	118.87 (114.81–123.04)	97.92 (95.44–100.44)
		2020	90.67 (87.51–93.92)	131.31 (127.14–135.58)	109.18 (106.61–111.79)
<b>US</b>	Optum EHR	2016	1.35 (1.17–1.56)	3.10 (2.85–3.35)	2.36 (2.20–2.53)
		2017	1.95 (1.72–2.20)	4.84 (4.53–5.17)	3.62 (3.41–3.84)
		2018	2.95 (2.65–3.29)	7.14 (6.73–7.57)	5.38 (5.10–5.66)
		2019	3.85 (3.47–4.26)	9.33 (8.83–9.86)	7.04 (6.70–7.39)
		2020	5.35 (4.81–5.94)	12.95 (12.24–13.70)	9.82 (9.34–10.32)
	Optum SES	2016	1.93 (1.60–2.31)	4.00 (3.54–4.51)	3.00 (2.71–3.32)
		2017	2.70 (2.32–3.12)	6.41 (5.84–7.02)	4.62 (4.27–4.99)
		2018	3.39 (2.97–3.85)	8.11 (7.47–8.78)	5.83 (5.44–6.24)
		2019	4.12 (3.66–4.62)	10.12 (9.41–10.86)	7.24 (6.81–7.69)
		2020	4.72 (4.22–5.27)	11.74 (10.97–12.54)	8.40 (7.93–8.89)
	CCAЕ	2016	2.23 (1.92–2.58)	5.75 (5.27–6.27)	4.08 (3.79–4.40)
		2017	3.23 (2.85–3.65)	7.57 (7.00–8.17)	5.50 (5.15–5.87)
		2018	3.62 (3.21–4.06)	8.44 (7.84–9.07)	6.12 (5.75–6.51)
		2019	4.35 (3.89–4.85)	10.39 (9.70–11.12)	7.48 (7.06–7.93)
		2020	4.71 (4.22–5.25)	11.21 (10.47–11.99)	8.08 (7.63–8.56)
	MDCD	2016	1.78 (1.25–2.46)	3.83 (3.23–4.50)	3.11 (2.67–3.59)
		2017	2.82 (2.16–3.62)	6.37 (5.60–7.22)	5.10 (4.55–5.70)
		2018	3.86 (3.03–4.86)	8.91 (7.94–9.97)	7.11 (6.41–7.86)
		2019	3.89 (3.10–4.80)	9.38 (8.43–10.41)	7.36 (6.69–8.08)
		2020	3.83 (3.07–4.71)	9.46 (8.52–10.47)	7.37 (6.71–8.07)

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**Supplementary Information Table 6. Baseline medical history of PPP patients identified using the specific PPP definition**

	Japan	US				
	JMDC	Optum EHR	Optum SES	CCAIE	MDCD	MDCR
	(n=6,376)	(n=1,848)	(n=1,563)	(n=1,838)	(n=578)	(n=195)
<b>History of cardiovascular disease</b>						
Atrial fibrillation	0.2%	3.1%	5.5%	1.4%	2.9%	8.7%
Cerebrovascular disease	2.2%	2.5%	5.1%	2.5%	2.8%	7.7%
Coronary arteriosclerosis	<0.1%	5.3%	11.1%	4.1%	6.4%	16.9%
Heart disease	8.2%	15.2%	23.9%	12.1%	18.7%	38.0%
Heart failure	2.7%	2.9%	5.6%	1.1%	5.5%	5.6%
Ischemic heart disease	3.0%	2.7%	5.9%	2.0%	3.3%	6.2%
Peripheral vascular disease	1.3%	3.1%	10.0%	2.2%	6.4%	10.3%
Pulmonary embolism	<0.1%	0.5%	0.6%	<0.3%	1.4%	<2.6%
Venous thrombosis	0.7%	1.2%	1.9%	1.0%	1.6%	<2.6%
<b>Medication use</b>						
Agents acting on the renin-angiotensin system	10.1%	24.0%	33.6%	24.9%	19.6%	42.0%
Antibacterials for systemic use	68.6%	45.8%	61.6%	65.0%	65.0%	71.3%
Antidepressants	4.0%	28.4%	30.0%	29.9%	39.5%	29.2%
Antiinflammatory and antirheumatic products	28.0%	45.8%	28.9%	33.7%	50.5%	34.9%
Antimalarials	<0.1%	2.6%	2.1%	2.2%	2.2%	<2.6%
Antipsoriatics	6.7%	13.9%	13.6%	17.6%	8.1%	25.1%
Anti-TNF $\alpha$ agents	0.8%	9.1%	8.8%	13.3%	11.6%	4.0%
Beta-blocking agents	4.3%	18.8%	21.9%	15.1%	15.6%	35.4%
Diuretics	2.1%	20.8%	26.8%	20.0%	20.2%	32.3%
Drugs for obstructive airway diseases	75.9%	55.6%	63.3%	65.4%	69.5%	68.2%
Drugs used in diabetes	4.4%	14.8%	18.5%	13.1%	15.0%	15.9%
Immunosuppressants	5.7%	22.6%	23.7%	28.1%	24.9%	22.1%
Lipid-modifying agents	11.6%	32.4%	36.9%	27.1%	23.2%	62.1%
Opioids	14.6%	28.6%	30.1%	26.9%	42.7%	28.2%
Phototherapy	1.6%	2.2%	2.2%	2.5%	1.0%	4.0%
Psycholeptics	17.8%	31.3%	29.4%	31.8%	45.7%	30.8%
Psychostimulants, agents used for ADHD, nootropics	12.7%	3.4%	2.8%	5.0%	5.2%	<2.6%
Topical corticosteroids	41.1%	38.9%	51.4%	57.2%	53.5%	64.3%

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**Supplementary Information Table 7. PPP treatments after diagnosis in patients identified using the specific PPP definition<sup>a,b</sup>**

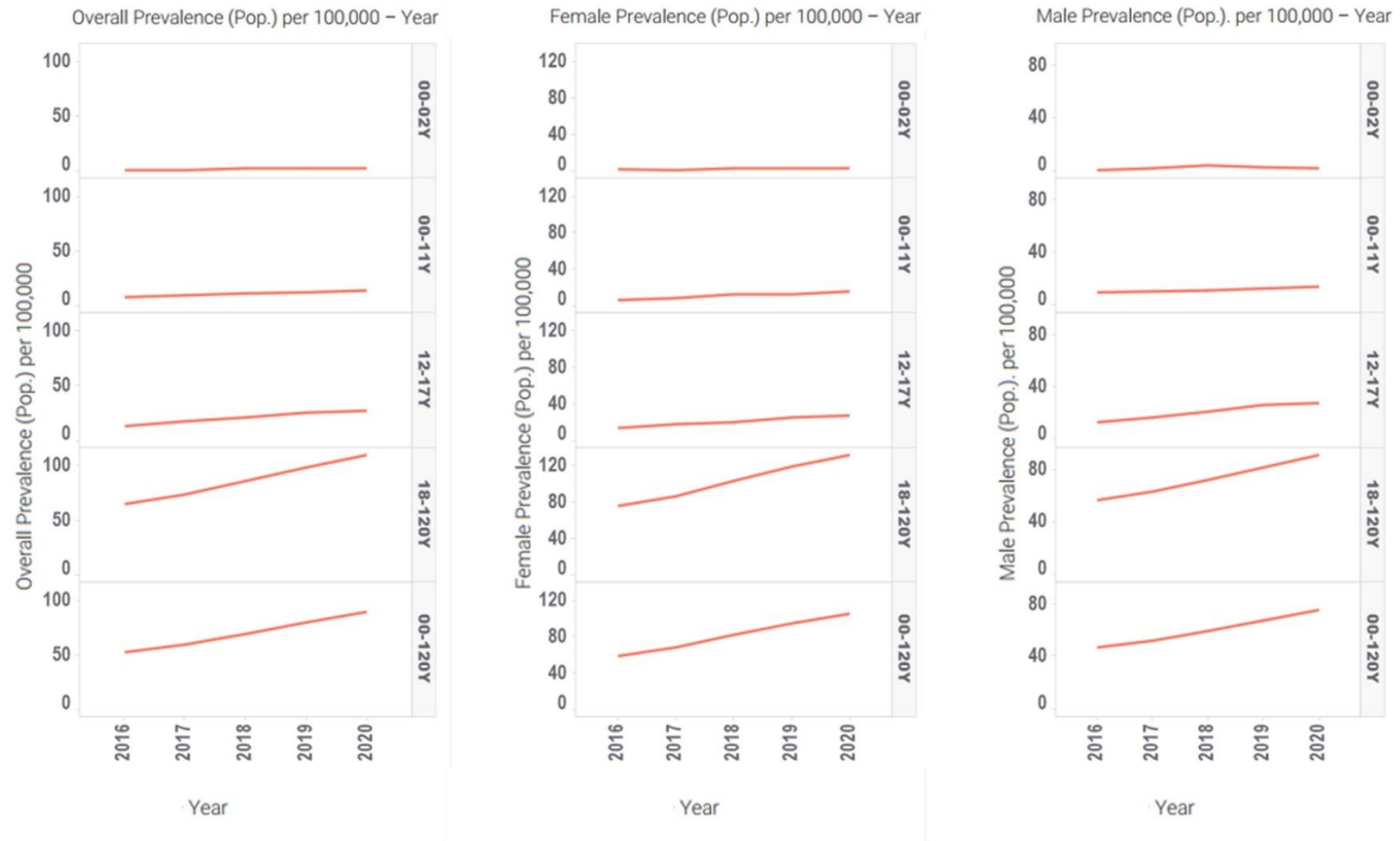
	US										Japan	
	Optum EHR		Optum SES		CCAE		MDCD		MDCR		JMDC	
	(n=1,848)		(n=1,563)		(n=1,838)		(n=578)		(n=195)		(n=6,376)	
	1-30d	31-365d	1-30d	31-365d	1-30d	31-365d	1-30d	31-365d	1-30d	31-365d	1-30d	31-365d
Phototherapy	3.6%	6.0%	2.4%	4.8%	3.9%	6.7%	1.7%	5.4%	4.8%	8.7%	10.8%	14.1%
Topical corticosteroid	44.9%	49.4%	45.4%	53.8%	50.3%	61.3%	52.6%	59.8%	48.0%	65.1%	58.6%	61.8%
Adalimumab	1.1%	6.3%	1.0%	4.3%	1.1%	6.4%	<0.9%	9.7%	–	–	–	–
Secukinumab	0.7%	3.1%	<0.3%	2.7%	0.8%	3.7%	<0.9%	3.1%	–	–	–	–
Infliximab	<0.3%	1.0%	0.8%	1.6%	0.7%	1.7%	<0.9%	2.6%	–	–	–	–
Ustekinumab	0.5%	2.0%	0.4%	2.6%	0.4%	3.4%	<0.9%	2.3%	–	–	–	–
Ixekizumab	–	–	–	–	0.4%	2.1%	1.4%	1.4%	–	–	–	–
Risankizumab	–	–	–	–	0.4%	1.5%	–	–	–	–	–	–
Guselkumab	–	–	<0.3%	1.3%	<0.3%	1.3%	–	–	–	–	–	–
Denosumab	<0.3%	1.2%	0.4%	1.4%	–	–	–	–	–	–	–	–
Vedolizumab	–	–	–	–	–	–	<0.9%	1.0%	–	–	–	–
Acitretin	1.3%	5.6%	2.6%	4.8%	3.2%	5.6%	1.9%	4.5%	<2.6%	7.2%	–	–
Tretinoin	<0.3%	1.1%	–	–	<0.3%	1.0%	–	–	–	–	–	–
Antimalarials	0.8%	2.1%	0.2%	1.3%	0.1%	1.3%	0.3%	1.9%	0.4%	0.8%	–	–
Anti-TNF alpha agents	1.6%	12.1%	2.3%	8.7%	2.4%	12.3%	2.1%	16.1%	1.2%	6.1%	–	–

<sup>a</sup>Treatments are shown if they were administered to  $\geq 1\%$  of patients in any database between 31 and 365 days following diagnosis (the index date).

<sup>b</sup>Tofacitinib was administered to <1% of patients across all databases.

PPP=palmoplantar pustulosis; US=United States; JMDC=Japan Medical Data Center; EHR=Optum<sup>®</sup> de-identified Electronic Health Record Database; SES=Optum's Clinformatics<sup>®</sup> de-identified Data Mart Database; CCAE=IBM<sup>®</sup> MarketScan<sup>®</sup> Commercial Database; MDCD=IBM<sup>®</sup> MarketScan<sup>®</sup> Multi-State Medicaid Database; MDCR=IBM<sup>®</sup> MarketScan<sup>®</sup> Medicare Supplemental Database; d=days; TNF=tumor necrosis factor.

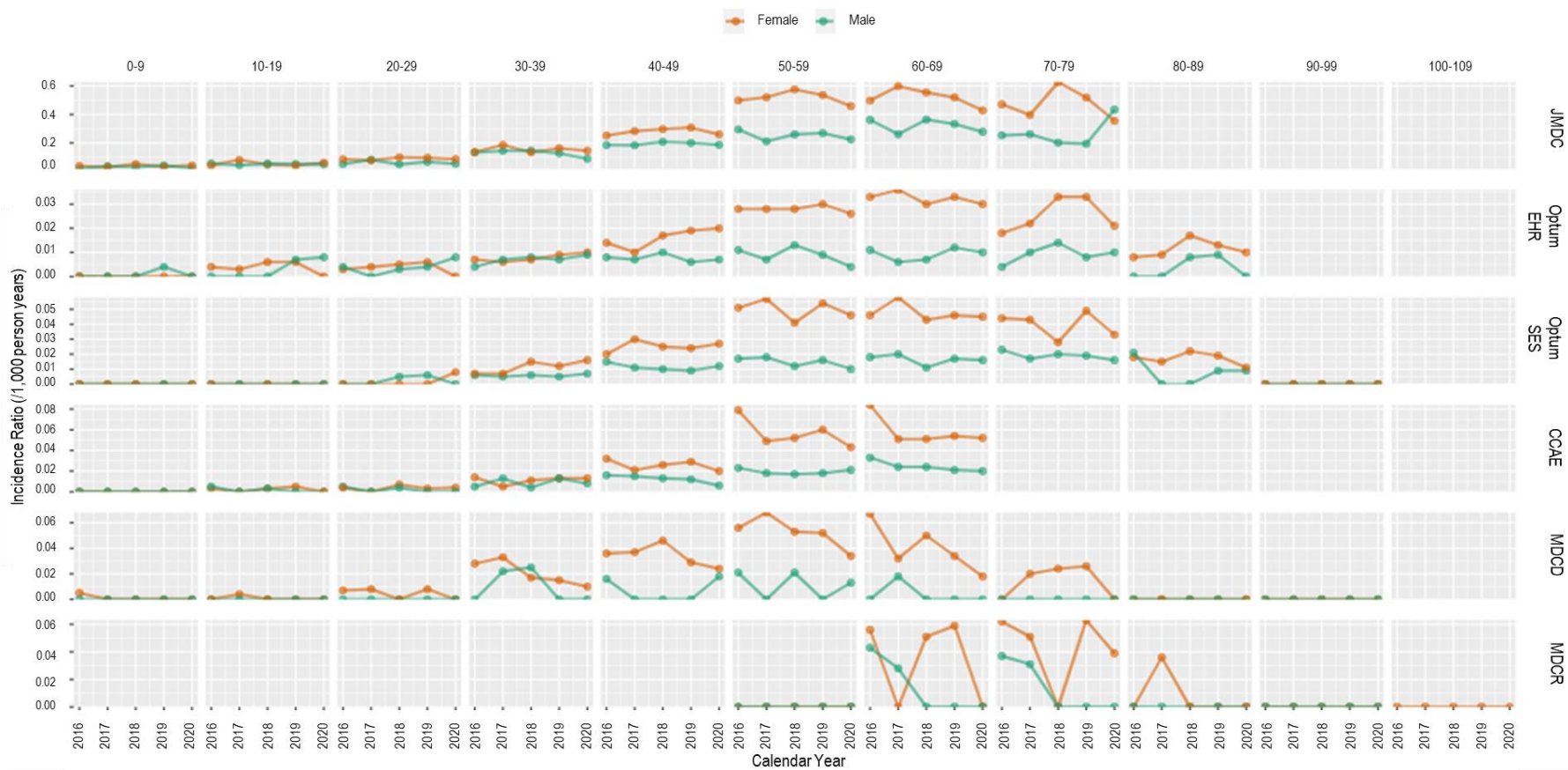
**Supplementary Information Fig. 1 Prevalence using the specific PPP definition in JMDC by age and sex**



PPP=palmoplantar pustulosis; JMDC=Japan Medical Data Center.



**Supplementary Information Fig. 2 Incidence rates using the specific PPP definition by database, age, sex, and year**



PPP=palmoplantar pustulosis; JMDC=Japan Medical Data Center; EHR=Optum® de-identified Electronic Health Record Database; SES=Optum’s Clinformatics® de-identified Data Mart Database; CCAE=IBM® MarketScan® Commercial Database; MDCCD=IBM® MarketScan® Multi-State Medicaid Database; MDCCR=IBM® MarketScan® Medicare Supplemental Database.