Spontana insatser vid bostadsbränder

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BRANDFORSK
2025:2

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Denna rapport utgör ett slutligt arbetsmanuskript för det rubricerade projektet. Den officiella projektrapporten, till vilken referens bör ske återfinns på Marie Cederschiöld Högskolans hemsida:

”Spontana insatser vid bostadsbränder”
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Introduktion

Tidigare forskning på räddningstjänstens effektivitet har visat att vanliga medborgare ofta spelar en viktig roll när det kommer till att upptäcka kriser och larma (Runefors, 2020) eller assistera vid evakuering (Runefors et al., 2021). Vid en bostadsbrand är tidsdimensionen avgörande (Jaldell, 2015) och om spontana insatser av förbipasserande, grannar och andra som befinner sig i närområdet kan minska tiden mellan brandupptäckt och påbörjad släckning kan de spela en viktig roll i arbetet mot nollvisionen inom bostadsbränder (MSB, 2010). Trots detta har omfattningen – och typen – av spontana insatser inte studerats nämnvärt, vilket innebär att det idag är okänt om spontana insatser är vanligare i vissa områden och om samhällsekonomiska/-demografiska skillnader samt tilliten mellan människor och till samhällsaktörer kan hjälpa till att förklara eventuella skillnader mellan olika geografiska områden.

I projektet Spontana insatser vid Bostadsbränder studerades detta och resultaten för projektet presenteras i föreliggande rapport. Inom ramen för projektet har även två vetenskapliga artiklar på engelska skrivits. Dessa återfinns som Appendix 1 och Appendix 2.

Bakgrund

Enkelt uttryckt uppstår en bostadsbrand till följd av en obruten kedja av händelser från värme och antändning till total förstörelse/dödsfall, om inte kedjan bryts längs vägen (Runefors et al., 2016). Släckning eller evakuering bryter kedjan och ju tidigare detta görs desto större är möjligheten att förhindra dödsfall eller förstörelse. Då ansvaret för bostaden är individens egna, är ansvaret för att bryta kedjan också i första hand individens (bostadsinnehavaren) medan samhället (i första hand räddningstjänsten) är tänkt som en aktör som ska stödja individen när denne inte klarar av situationen. I realiteten innebär detta att individen i huvudsak är ansvarig för upptäckt och larmande (samt om möjligt initiering av släckningsarbetet och evakuering) medan samhället i huvudsak ansvarar för släckning och evakuering.

För stora delar av befolkningen är denna uppdelning välfungerande. En mycket stor majoritet av befolkningen har brandvarnare och brandsläckare (Nilson and Bonander, 2019, Henrekson et al., 2024) och kan därmed upptäcka bränder tidigt, varna, evakuera och/eller påbörja släckning. Vissa grupper – som är socioekonomiskt svagare – saknar dock dessa hjälpmedel (Nilson and Bonander, 2019, Henrekson et al., 2024) och det finns särskilt utsatta eller funktionsnedsatta grupper i samhället som inte heller har förmåga att varna, evakuera och/eller påbörja släckning. Samma grupper är också särskilt utsatta i dödsbränder (Jonsson et al., 2017, Jonsson and Jaldell, 2019, Jonsson et al., 2022) vilket förstärker behovet av att samhället tar ett större ansvar.

Tidigare studier har påvisat stora skillnader i utryckningstider i Sverige och belyst problematiken i relation till räddningstjänstens uppdrag (Sandin and Wester, 2010). Som ett led i att minska tiden mellan larmande och insats har flera olika interventioner implementerats i Sverige. Detta har inneburit satsningar på exempelvis första insatspersoner (FIP), men också involverandet av andra samhällsaktörer, som till exempel hemtjänstpersonal eller ordningsvakter, eller civila insatspersoner (CIP). Effektivitetsstudier av denna typ av insatser har påvisat blandade resultat (Sund and Jaldell, 2018). Ett viktigt skäl till detta är att även om engagemanget av olika aktörer som befinner sig i närheten av branden kan minska tiden mellan larm och påbörjad räddningsaktion, påverkar detta inte tiden för upptäckt och larmande, där den avgörande tidsvinsten kan göras. Med andra ord har fokus varit på fasen mellan larmande och första insats snarare än fasen mellan branduppkomst och larmande.

Denna första fas av brandförloppet kan förkortas med hjälp av tekniska hjälpmedel såsom brandlarm, som dock kräver att den drabbade ska ha förmåga att kalla på hjälp. Utan denna förmåga är effektiviteten av brandlarm betydligt lägre (Runefors and Nilson, 2021) och därför kan andra metoder behöva införas för att möjliggöra en tidig upptäckt. Enligt en mindre studie på räddningstjänstinsatser i äldre personers hushåll, verkar grannar eller förbipasserande ha en betydande roll i att larma samt genomföra första insatser (Runefors, 2020).

Vikten av att ha andra människor i närheten för att förhindra konsekvenserna av bostadsbränder har belysts tidigare. Studier har påvisat att sammanboende skyddar mot risken att omkomma i en bostadsbrand (Nilson et al., 2020, Jonsson and Jaldell, 2019) och att skyddsorsaken sannolikt är kopplad till effekten av att ha fler individer som kan upptäcka, larma, släcka och evakuera (Runefors, 2020). Att fler individer kan upptäcka, larma, släcka och evakuera är också sannolikt kopplat till den lägre mortalitetsrisken som setts i flerfamiljshus och i urbana kontexter (Jonsson et al., 2017, Nilson and Bonander, 2021), en riskminskning som är särskilt intressant då individer i dessa områden mer sällan har både brandvarnare och brandsläckare/brandfilt (Nilson and Bonander, 2019, Henrekson et al., 2024).

Det kan därför spekuleras att ”mänskligt skydd” i form av närstående, grannar och förbipasserande kan kompensera för bristerna hos mer tekniska skydd. För att individer ska vilja ingripa krävs det dock underliggande relationella faktorer och, mest tydligt, tillit. Tillit beskrivs i forskning som en central faktor för ett väl fungerande samhälle (Uslaner, 2002, Uslaner och Brown, 2005, Bjørnskov, 2012) och det är sedan länge etablerat att Sverige tillsammans med övriga nordiska länder tillhör en liten grupp av högtillitsländer i världen (Delhey och Newton, 2005; Rothstein och Stolle, 2008). Den höga nivån av tillit i Sverige reflekterar en optimistisk och prosocial syn på medmänniskor, samt ett starkt förtroende för gemensamma institutioner (SOM-undersökningen och Tillitsbarometern).

Tilliten och nöjdheten till svensk räddningstjänst är generellt hög även om den varierar mellan olika kommuner. Resultat från ett tidigare brandforskfinansierat projekt tyder också på att en högre objektiv risk för branddödlighet är korrelerat med lägre nöjdhet för räddningstjänsten (Nilson och Andersen, 2024). Detta förstärks ytterligare av den upplevda risken att skadas i en bostadsbrand är högre i lågtillitsområden (Nilson and Mankell, 2022).

I likhet med att tilliten till lokala aktörer varierar stort mellan olika svenska kommuner, varierar också tilliten till grannar/personer i närområdet (Tillitsbarometern). Utifrån resultaten om tillit till samhällsaktörer skulle hypotesen därför vara att i kommuner med lägre tillit till grannar/personer i sitt närområde skulle färre grannar/förbipasserande ingripa vid bostadsbränder. Men detta är idag okänt och likheten är inte given. Jämfört med tilliten till samhällsaktörer är tilliten till grannar mer komplex då tillitsrelationen är flerdimensionell. Den innefattar tilliten hos den drabbade (i likhet med tilliten till samhällsinstitutioner) men också tilliten hos den som agerar. Den som agerar behöver dessutom inte nödvändigtvis agera utifrån medkänsla och samhörighet. Till exempel, om den som agerar är en granne i ett flerfamiljshus kan agerandet vara på grund av ett egenintresse för att skydda den egna bostaden snarare än altruistiska skäl. Agerandet är därför eventuellt frikopplat från tillit men kan oavsett spela en central roll för arbetet mot Nollvisionen.

Syfte och frågeställningar

En stor del av det praktiska brandreaktiva arbetet är idag fokuserat på antingen promotionen av tekniska lösningar för snabbare upptäckt (t.ex. brandlarm) eller individuell släckningsutrustning, alternativt lösningar för att minska tiden mellan larm och insats (t.ex. CIP, FIP, m.m.). Det är idag välkänt att en stor del av de som omkommer i bostadsbränder på olika sätt är sårbara individer (Jonsson and Jaldell, 2019) och dessa individer har begränsade möjligheter att larma, påbörja släckningsarbete eller evakuering, något som tydligt exemplifieras av att en stor andel av branddödsfallen omkommit i bränder som startat som mycket små och långsamt tilltagande bränder (Jonsson et al., 2022). Det finns därmed stor potential i att involvera grannar och förbipasserande och stimulera till ökad villighet till att agera som i sin tur kan leda till en minskad brandmortalitet.

Syftet med projektet är därför att undersöka grannars och förbipasserandes roll i upptäckten och hanteringen av bostadsbränder, samt att analysera hur denna roll varierar mellan olika typer av områden och om det finns samband med lokalsamhällestillit. De specifika frågeställningarna som projektet ämnar svara på är:

1. Hur stor roll spelar förbipasserande och grannar i upptäckandet och hanterandet av bränder?
2. Hur skiljer sig agerande av grannar och förbipasserande i olika typer av områden?
3. Finns det en koppling mellan lokala nivåer av tillit och ingripande vid bostadsbränder?

Material, metod och genomförande

Vi har använts oss av data från tre olika källor: räddningstjänstens händelserapporter, data från Tillitsbarometern, som är en enkätstudie som med jämna mellanrum genomförs av Centrum för Civilsamhällesforskning vid Marie Cederschiöld högskola, samt data på DeSO-nivå från Statistiska centralbyrån (SCB).

Tillitsbarometern är en befolkningsundersökning som studerar variationer i tillit bland ett slumpmässigt urval av invånare 18-85 år kopplade till en kommun respektive bostadsområde i 49 kommuner runtom i Sverige. Datainsamlingar har genomförts 2009, 2017 och 2020 och ytterligare en datainsamling planeras att genomföras under våren 2024. I Tillitsbarometern mäts olika aspekter av tillit men också individernas upplevda (o)trygghet, syn på risker samt deras uppfattning om samhällets förmåga till riskhantering. Tillitsbarometern har också specifika frågor kring grannar och området där respondenten bor. Bland annat så ställs det frågor kring om människorna i området där respondenten bor är hjälpsamma, enkla att samarbete med och huruvida det går att lita på dem. Med hjälp av dessa frågor har vi konstruerat två index som dels mäter lokalsamhällestilliten i ett bostadsområde, dels den sociala kontrollen. Ifall man kombinerar dessa två index får man ett mått på ett bostadsområdes kollektiva handlingsförmåga.

Det andra datamaterialet som vi har använt oss av är Räddningstjänstens händelserapporter mellan 2018 och 2023 i de 49 kommuner som omfattas av Tillitsbarometern. Varje gång det har varit en bostadsbrand så registrerar räddningstjänsten denna enligt ett schema och skickar in till MSB. Dessa händelserapporter innehåller ett antal olika variabler som till exempel brandens uppkomst, vilka aktörer som var på plats, tidsåtgång och de åtgärder som vidtogs. Vi har kodat fritextsvaren som beskriver händelseförloppet och sammanställt en databas över vem som upptäckt bränderna, larmade räddningstjänsten, och vem som genomförde de första släckningsåtgärderna.

Vi har dessutom inhämtat statistik på områdesnivå (så kallad DeSO-nivå) från SCB. DeSO (Demografiska statistikområden) är ett geografiskt indelningssystem som tagits fram av SCB för att möjliggöra detaljerad statistik på lokal nivå. DeSO-områden är mindre än kommuner och stadsdelar och bygger på befolkningsstorlek snarare än yta, vilket gör dem särskilt användbara för analyser av lokala variationer i till exempel socioekonomiska förhållanden eller tillit. Sverige har 5 984 DeSO-områden, med mellan 700 och 2 700 invånare i varje område. De inhämtade variablerna inkluderar bland annat Care Need Index (CNI), ett sammansatt mått som fångar social sårbarhet baserat på faktorer som låg inkomst, arbetslöshet, låg utbildning och social isolering, andel utrikes födda, genomsnittlig disponibel inkomst, utbildningsnivå, boendeform (andel lägenheter och särskilt boende) samt grad av urbanitet.

Kodning av händelserapporter

Vår databas över händelserapporter inkludera totalt 14 684 bränder. Totalt uteslöts 1 855 brandtillbud från analysen eftersom de inte inträffade i en faktisk bostad utan till exempel i ett trapphus, ett gemensamt källarförråd eller i en kolonistuga. Detta resulterade i ett slutligt urval på 12 829 bostadsbränder. Med hjälp av de textbeskrivningar som räddningstjänsten gett för varje brandhändelse kodade vi manuellt vem som upptäckte branden, vem som larmade myndigheterna och vem som gjorde de första försöken att släcka den. Alla tre projektdeltagarna deltog i det manuella kodningsarbetet. Först granskade vi de 50 första brandhändelserna tillsammans och utvecklade ett kodningschema med olika aktörstyper. Därefter kodade vi var och en 100 händelser innan vi träffades igen för att diskutera definitioner och svårklassificerade fall. Genom att föra en kontinuerlig dialog under hela kodningsfasen säkerställde vi att alla medförfattare hade en gemensam förståelse för hur kodningen skulle genomföras. Vi använde följande kodningschema för *Upptäcka, Larma,* och *Påbörja släckning*:

- Person i bostaden (boende, eller någon som befann sig i bostaden)
- Granne
- Förbipasserande/övrig person
- Professionell (hemtjänst, ordningsvakter, polis)

- Räddningstjänst
- Teknisk lösning
  - Hemlarm
  - Trygghetslarm
  - Automatlarm
  - Sprinkler
- Ej aktuellt
- Vet ej
- Bortfall (om branden har skett i gemensamma utrymmen, tex sopnedkast, trapphus, innergården på ett lägenhetshus, utanför tomtgräns, båt, bil, husvagn eller om det inte är en brand)

Index över lokalsamhällestillit, social kontroll och kollektiv handlingsförmåga

I vår analys av relationen mellan lokalsamhällestillit och huruvida grannar och förbipasserande agerar vid bostadsbränder behövde vi skapa ett mått på lokalsamhällestillit och kollektiv förmåga på DeSO-nivå. I analysen använde vi de DeSO-områden där vi hade minst 18 svarande i Tillitsbarometern för att säkerställa stabiliteten i de aggregerade måtten på lokalsamhällestillit och kollektiv förmåga. Totalt inkluderade vi aggregerade mått på kollektiv förmåga från 10 610 respondenter i 302 DeSO-områden. Antalet svarande per geografisk enhet i vår studie är i linje med tidigare forskning, såsom Sampson et al. (1997), som analyserade data från 8 782 respondenter i 343 stadsdelar i Chicago. På liknande sätt undersökte Gerell & Kronkvist (2017) kollektiv förmåga i Malmö, Sverige, med enkätdata från 4 051 respondenter i 96 stadsdelar, med ett minimum på 20 respondenter per område i sin analys. Vi valde att inte enbart använda ett mått på lokalsamhällestillit eftersom kollektiv förmåga som analytiskt begrepp har en så nära koppling till förmågan och viljan att ingripa vid bostadsbrand.

Indexet för kollektiv förmåga består av två delskalor med vardera fem påståenden som mäts med en Likert-skala (Sampson et al., 1997). Dessa kombineras till ett sammansatt index som fångar nivån av kollektiv förmåga. Den första delskalan mäter lokalsamhällestillit, medan den andra avser social kontroll. Den exakta ordalydelsen för frågorna i de två delskalorna återfinns i Bilaga 1. För att skapa de två delskalorna räknade vi ut ett genomsnitt för varje deltagares svar på fem påståenden inom respektive område. För att kontrollera att frågorna hängde ihop på ett bra sätt använde vi ett statistiskt mått som kallas Cronbach’s alpha. Värdet låg på 0,81 för social sammanhållning och 0,87 för social kontroll, vilket tyder på att frågorna inom varje delskala mäter samma sak på ett tillförlitligt sätt. Därefter skapade vi ett gemensamt index för kollektiv förmåga genom att slå ihop de två delskalorna. Även detta sammanslagna mått hade ett högt värde på 0,86, vilket visar att det är ett stabilt och sammanhängande mått. Slutligen beräknade vi de aggregerade måtten för delskalorna och det kombinerade indexet för kollektiv förmåga på DeSO-nivå genom att summera de individuella poängen inom varje DeSO och dividera med antalet respondenter i området.

Mot denna bakgrund använder vi både det sammanslagna måttet på kollektiv förmåga och de två delskalorna i våra analyser. Det kombinerade måttet ger en övergripande bild av de sociala dynamikerna i området, medan delskalorna gör det möjligt att analysera lokalsamhällestillit och social kontroll som två skilda, men kompletterande, dimensioner.

Resultat

Resultaten från projektet presenteras i två delstudier; en som behandlar händelsekedjorna – det vill säga vilka som upptäcker, larmar och släcker vid bostadsbränder, och en studie som behandlar hur grad av tillit hänger ihop med grannars och förbipasserandets roll.

Sammanfattningsvis har delstudie 1 visat att grannar och förbipasserande spelar en viktig roll i att upptäcka bostadsbränder och larma räddningstjänsten. Deras engagemang tycks dock vara vanligare i områden med en högre andel etniska svenskar och flerbostadshus. I mer förortslika miljöer fylls denna roll ofta av privata larmsystem. I kontrast verkar ansvaret för att identifiera och rapportera bränder i glesbygdsområden och i stadsdelar med större etnisk mångfald i högre grad falla på de boende själva.

Sammanfattningsvis har delstudie 2 visat att i områden där den upplevda kollektiva förmågan, särskilt lokalsamhällestilliten, är högre, tenderar invånare att agera i ett tidigt skede av brandförloppet, vilket understryker det praktiska värdet av begreppet bortom självrapporterade uppfattningar. Även om vi inte identifierade något positivt samband mellan kollektiv förmåga och att grannar eller förbipasserande initierar brandsläckningsinsatser, indikerar resultaten att social tillit och gemensamma förväntningar på agerande påtagligt kan påverka hur individer reagerar i nödsituationer. Genom att inkludera både urbana och rurala miljöer belyser studien dessutom hur fysisk närhet kan underlätta handlingsberedskap i tätbebyggda områden, men att social sammanhållning – oavsett befolkningstäthet – är avgörande för om människor väljer att ingripa.

Resultaten för respektive delstudie presenteras mer ingående nedan.

Delstudie 1: Händelsekedjor vid bostadsbränder

Aktörer i olika skeden av bostadsbränder och områdesfaktorers betydelse

Tabell 1 visar tydliga skillnader i vem som identifierar, larmar och släcker bostadsbränder i Sverige. Den vanligaste aktören i samtliga skeden är **personen i bostaden**, som står för 45 % av upptäckterna, 41 % av larmen och 33 % av släckningsinsatserna enligt händelserapporterna. Det är alltså i de flesta fall den boende själv som upptäcker branden, kontaktar räddningstjänsten och inleder någon form av släckningsförsök. **Grannar och förbipasserande** spelar också en viktig roll, särskilt när det gäller att upptäcka (29 %) och larma (31 %) om branden. Däremot är det mer ovanligt att de gör inledande släckningsinsatser (6 %). **Räddningstjänsten** är den främsta aktören när det gäller att faktiskt släcka bränder – de står för 33 % av alla släckinsatser – men är av naturliga skäl i princip aldrig först med att upptäcka eller larma. Automatiska system, såsom **automatiska brandlarm** (7 %) och **säkerhetslarm** (privata: 2 %, offentliga: 1 %), bidrar i viss utsträckning till att upptäcka bränder och larma, men spelar en mindre roll i det totala brandförloppet. Noterbart är att andelen **okänd aktör** är relativt hög i alla tre skeden (mellan 3 % och 15 %), vilket antyder att dokumentationen i vissa fall är bristfällig eller att brandförloppet inte varit helt tydligt beskrivet i händelserapporten.

Tabell 1. Upptäcka, larma och inledande släckningsförsök

	Upptäcka		*Larma*		*Släcka*	
	n	%	n	%	n	%
Person i bostaden	5817	45%	5245	41%	4212	33%
Grannar och förbipasserande	3691	29%	4026	31%	755	6%
Professionella aktörer	287	2%	722	6%	702	5%
Räddningstjänst	3	0%	3	0%	4261	33%
Privat larm (hemlarm)	303	2%				
Offentligt larm (trygghetslarm)	105	1%				
Automatlarm	872	7%	872	7%		
Sprinkler					35	0%
Inte aktuellt					2482	19%
Inte känt	1751	14%	1961	15%	382	3%

För att undersöka kopplingar mellan olika faktorer på områdesnivå och den aktör som agerade i de olika skedena av branden gjordes så kallade logistiska regressionsanalyser. Denna typ av analys används för att studera sannolikheten att något inträffar (t.ex. att en viss aktör agerar) beroende på olika faktorer. Resultatet redovisas ofta som oddskvoter (OK), som visar hur mycket mer eller mindre sannolikt något är, samt p-värden som visar om sambanden är statistiskt säkerställda.

Upptäcka:

- Sannolikheten att en *person i bostaden* upptäcker branden var högre i områden med en större andel utrikes födda (OK = 5,66, $p < 0{,}001$) och i glesbygdsområden med en lägre andel lägenheter (OK = 0,53, $p < 0{,}001$).
- Bränder som upptäcktes av *grannar och förbipasserande* var vanligare i områden med en lägre andel utrikes födda (OK = 0,55, $p = 0{,}018$) och en högre andel lägenheter (OK = 3,70, $p < 0{,}001$).
- Bränder som upptäcktes via *privata säkerhetslarm* var mer sannolika i områden med en lägre andel lägenheter (OK = 0,12, $p < 0{,}001$) och mindre sannolika i glesbygdsområden, vilket framgår av att sannolikheten var högre i kommunhuvudorter (OK = 2,44, $p < 0{,}001$) och stadsmiljöer (OK = 2,29, $p = 0{,}006$).
- Bränder som upptäcktes via *offentliga säkerhetslarm* var mindre sannolika i glesbygdsområden, vilket antyds av att de var mer sannolika i tätortsnära områden (OK = 3,19, $p = 0{,}053$), även om modellen hade låg förklaringsgrad (Tjur $R^2 = 0{,}001$).
- Bränder som identifierades av en *professionell* var vanligare i områden med högre inkomstnivå (OK = 1,15, $p = 0{,}014$), en lägre andel utrikes födda (OK = 0,11, $p = 0{,}008$) samt i urbana (OK = 2,79, $p < 0{,}001$) och stadsmiljöer (OK = 3,18, $p = 0{,}001$).

Larma:

- Bränder där en *person i bostaden* larmade räddningstjänsten var mer sannolika i områden med en högre andel utrikes födda (OK = 4,67, p < 0,001) och i områden med färre lägenheter (OK = 0,41, p < 0,001). Sannolikheten var också lägre i tätortsnära områden (OK = 0,76, p = 0,001), kommunhuvudorter (OK = 0,56, p < 0,001) och stadsmiljöer (OK = 0,53, p < 0,001). Dessutom var en lägre Care Need Index (CNI) kopplad till en högre sannolikhet att en person i bostaden larmade räddningstjänsten (OK = 0,64, p < 0,001).
- Bränder där *grannar eller förbipasserande* larmade räddningstjänsten var mer sannolika i områden med en högre andel lägenheter (OK = 4,31, p < 0,001). Det fanns inga signifikanta samband med utrikes bakgrund, inkomst, grad av urbanisering eller andra faktorer.
- Bränder där en *professionell* larmade räddningstjänsten var mer sannolika i tätortsnära områden (OK = 2,16, p < 0,001), urbana miljöer (OK = 2,95, p < 0,001) och stadsmiljöer (OK = 3,43, p < 0,001). Sannolikheten var lägre i områden med en hög andel lägenheter (OK = 0,42, p < 0,001).

Släcka:

- Sannolikheten att en *person i bostaden* påbörjade släckningen av branden var högre i områden med färre lägenheter (OK = 0,78, p = 0,011) och mindre särskilt boende (OK = 0,28, p < 0,001). Den var också högre i områden med en större andel utrikes födda (OK = 5,16, p < 0,001) och högre utbildningsnivå (universitetsutbildning; OK = 1,83, p = 0,033), men lägre i områden med högre Care Need Index (CNI) (OK = 0,62, p < 0,001).
- Bränder där *grannar eller förbipasserande* påbörjade släckningen hade inga statistiskt signifikanta samband med de flesta prediktorer. Det fanns ett svagt negativt samband med förekomsten av särskilt boende (OK = 0,37, p = 0,130) och insatstid (OK = 0,75, p = 0,094), men inget av dessa nådde statistisk signifikans.
- Bränder där en *professionell* påbörjade släckningen var mer sannolika i områden med färre lägenheter (OK = 0,58, p = 0,005) och mindre sannolika i områden med en högre andel utrikes födda (OK = 0,08, p < 0,001). Sannolikheten var också högre i områden med mer särskilt boende (OK = 5,45, p < 0,001) och lägre vid längre insatstider (OK = 0,66, p = 0,037).
- Bränder där räddningstjänsten påbörjade släckningen var mindre sannolika i tätortsnära områden (OK = 0,65, p < 0,001), kommunhuvudorter (OK = 0,59, p < 0,001) och stadsmiljöer (OK = 0,65, p < 0,001), samt mindre sannolika vid längre insatstider (OK = 0,79, p = 0,002).
- Områden där ingen släckning krävdes var mer sannolika i urbana miljöer (OK = 1,48, p < 0,001) och stadsmiljöer (OK = 1,30, p = 0,045), samt i områden med fler lägenheter (OK = 1,43, p = 0,002), mer särskilt boende (OK = 2,49, p = 0,005) och längre insatstider (OK = 1,20, p = 0,016).

Typiska händelsekedjor vid bostadsbränder

Att analysera de olika faserna oberoende av varandra ger intressanta och varierande resultat, men det är också tydligt från Tabell 2 att vissa kombinationer av aktörer är mycket vanligare än andra. Tabell 2 inkluderar endast de kombinationer med över 100 händelser, vilket innebär att 2800 händelser med mindre vanliga kombinationer har uteslutits. I sig själv visar detta att händelsekedjorna följer en typisk långsvansfördelning, där de tre vanligaste kombinationerna (Person i bostaden – Person i bostaden – Person i bostaden; Grannar och förbipasserande – Grannar och förbipasserande – Räddningstjänst; samt Person i bostaden – Person i bostaden – Räddningstjänst) står för totalt 48 % av alla fall.

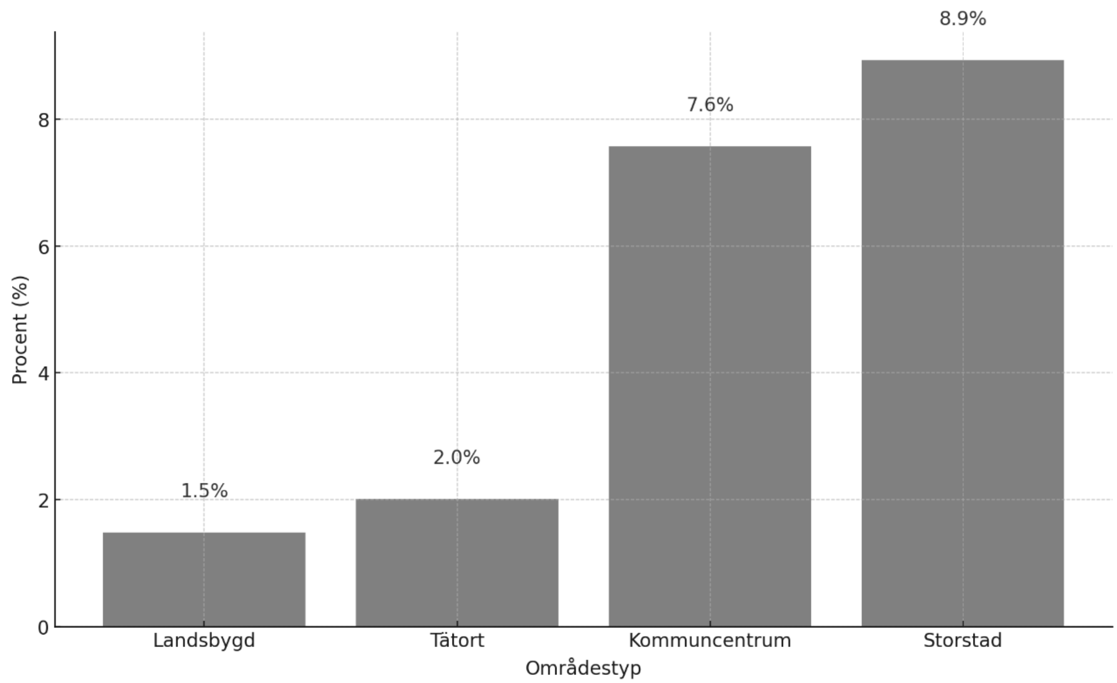
Tabell 2. De vanligaste händelsekedjorna

Upptäcka	*Larma*	*Påbörja släckning*	*No*	*%*
Grannar och förbipasserande	Grannar och förbipasserande	Grannar och förbipasserande	498	4%
Grannar och förbipasserande	Grannar och förbipasserande	Inte aktuellt	878	7%
Grannar och förbipasserande	Grannar och förbipasserande	Person i bostaden	353	3%
Grannar och förbipasserande	Grannar och förbipasserande	Räddningstjänst	1847	14%
Person i bostaden	Grannar och förbipasserande	Person i bostaden	243	2%
Person i bostaden	Person i bostaden	Inte aktuellt	739	6%
Person i bostaden	Person i bostaden	Grannar och förbipasserande	105	1%
Person i bostaden	Person i bostaden	Person i bostaden	3041	24%
Person i bostaden	Person i bostaden	Räddningstjänst	1267	10%
Professionell	Professionell	Professionell	143	1%
Privat larm	Professionell	Räddningstjänst	101	1%
Automatlarm	Automatlarm	Inte aktuellt	243	2%
Automatlarm	Automatlarm	Person i bostaden	111	1%
Automatlarm	Automatlarm	Professionell	334	3%
Automatlarm	Automatlarm	Räddningstjänst	126	1%

Utöver att belysa typiska händelsekedjor visar Tabell 2 att när grannar eller förbipasserande är involverade i att agera vid en bostadsbrand är deras roll tydligt kopplad till upptäckt och larm. Det är anmärkningsvärt att en betydligt större andel av bränder som upptäcks av grannar eller förbipasserande släcks av räddningstjänsten – ungefär hälften – jämfört med bränder som upptäcks av boende själva. När boende är de första att upptäcka branden, påbörjar de släckningsinsatser i cirka 56 % av fallen, medan räddningstjänsten är först att agera i endast 23 %. Vidare är den vanligaste typen av incident där räddningstjänsten är först att inleda släckningsarbetet en brand som har upptäckts och larmats av grannar eller förbipasserande.

Resultaten visar också att grannar och förbipasserande oftare identifierar bostadsbränder och larmar räddningstjänsten i områden med fler lägenheter och färre personer med utländsk bakgrund. Att grannar eller förbipasserande i högre grad engagerar sig vid bränder i tätbefolkade områden tyder på att närheten till andra människor ökar sannolikheten för att en brand upptäcks av någon utanför hushållet. Samtidigt visar det stora antalet bränder i storstadsområden och kommuncentrum (se Figur 1) som rapporterats av grannar eller förbipasserande och sedan klassificerats som ”släckning ej tillämplig”, att det rör sig om mindre bränder. Det kan alltså vara så att bränder som rapporteras till räddningstjänsten i landsbygdsområden oftare är större, medan mindre bränder i dessa områden hanteras utan att räddningstjänsten larmas och därför inte syns i datamaterialet. Detta förstärks av att räddningstjänsten oftare släcker bränder i landsbygdsområden, trots att tidigare svenska studier visat att brandskyddet där generellt sett är bättre än i stadsområden (Henrekson et al., 2024; Nilson & Bonander, 2019).

Figur 1. Brandtillbud upptäckta av grannar och förbipasserande där släckning ej var tillämpbart.



Framtida forskning bör undersöka om mönster från delstudie 1 är unika för Sverige eller speglar bredare internationella trender. Ur ett praktiskt perspektiv behövs riktade strategier för att hantera sårbarheter i glesbygdsområden och områden med mer etnisk mångfald. Det finns också behov av att diskutera hur räddningstjänsten/myndigheterna kan uppmuntra grannar och förbipasserande att ingripa på ett lämpligt sätt — och hitta en balans som stödjer tidig upptäckt samtidigt som onödiga utryckningar minimeras.

Delstudie 2: Kollektiv handlingsförmåga och ingripande vid bostadsbränder

Delstudie två handlar om huruvida grannars och förbipasserandes agerande vid bostadsbränder påverkas av graden av tillit och kollektiv handlingsförmåga i lokalsamhället. Även om kollektiv handlingsförmåga som analytisk ansats inte ingick i den ursprungliga studiedesignen så valde vi att lägga till det då det har en så nära koppling till förmågan och viljan att ingripa vid bostadsbrand.

Korrelationsanalysen som presenteras i Tabell 3 visar att huruvida en granne eller förbipasserande upptäckte branden eller larmade myndigheterna är starkt korrelerade med varandra. Vidare finns det ett positivt samband mellan dessa två variabler och kollektiv förmåga samt dess två delskalor. Intressant nog är kollektiv förmåga på DeSO-nivå positivt korrelerad med en högre andel av befolkningen med utländsk bakgrund, samtidigt som den är negativt korrelerad med genomsnittlig nettoinkomst – ett mönster som står i kontrast till tidigare studier (se t.ex. Mazerolle et al., 2010; Sampson et al., 1997). Dessutom är kollektiv förmåga positivt korrelerad med mer urbana områden samt områden där en högre andel av befolkningen har en universitetsutbildning.

Variabeln som anger om en granne eller förbipasserande inledde släckningsinsatsen är inte signifikant korrelerad med någon av de inkluderade variablerna förutom upptäckt och larm.

Tabell 3. Korrelationsmatris över grannars och förbipasserandes agerande vid bostadsbränder samt lokalsamhällets sociala och strukturella egenskaper

	1	2	3	4	5	6	7	8	9
1. Upptäcka	1.00								
2. Larma	0.93***	1.00							
3. Släcka	0.25***	0.24***	1.00						
4. Inkomst	-0.03	-0.05*	0.02	1.00					
5. Andel utlandsfödda	0.09***	0.11***	0.03	-0.39***	1.00				
6. Universitetutb.	0.08***	0.06**	0.04	0.67***	0.00	1.00			
7. Grad av urbanitet	0.12***	0.14***	0.03	0.05*	0.64***	0.46***	1.00		
8. Kolllektiv handlingskraft	0.12***	0.14***	-0.02	-0.42***	0.79***	0.00	0.56***	1.00	
9. Social control	0.11***	0.12***	-0.02	-0.38***	0.74***	0.00	0.53***	0.95***	1.00
10. Social cohesion	0.13***	0.14***	-0.01	-0.43***	0.76***	-0.00	0.53***	0.94***	0.79***

Utöver korrelationsanalysen genomfördes också så kallade multinivåregressioner, vilket innebär att man kan undersöka samband mellan olika faktorer samtidigt som man kontrollerar för andra saker som också kan påverka resultatet, som exempelvis utbildningsnivå eller grad av urbanitet. Denna analys bekräftade de tidigare resultaten då den visade att i områden med hög kollektiv handlingsförmåga – där invånarna har tillit till varandra och upplever en vilja att hjälpa till – var det mer sannolikt att en granne eller förbipasserande upptäckte branden och larmade räddningstjänsten. Däremot såg vi inget liknande samband när det gäller att påbörja släckningsinsatsen. Tvärtom minskade sannolikheten något i områden med hög kollektiv förmåga. När vi delade upp det övergripande måttet på kollektiv förmåga i sina två delar – lokalsamhällestillit och informell social kontroll – visade det sig att det enbart var lokalsamhällestillit som hade ett signifikant samband med att grannar och förbipasserande upptäckte branden och slog larm. Det tyder på att tillit och goda relationer mellan grannar kan vara viktigare än normer om att ingripa vid avvikande beteenden när det gäller att agera vid en brand.

Det tycks alltså finnas empiriskt stöd för idén att kollektiv förmåga inte bara speglar upplevd social sammanhållning och vilja att ingripa, utan även omsätts i konkreta, livräddande handlingar i verkliga nödsituationer. Utöver att sannolikheten att människor som bor i mer tätbebyggda områden rycker in därför att de befinner sig tillräckligt nära för att kunna upptäcka en brand när den bryter ut, visar vår studie också att social närhet är en faktor för ingripande av grannar eller förbipasserande.

Diskussion och slutsatser

Syftet med projektet har varit att undersöka grannars och förbipasserandes roll i upptäckten och hanteringen av bostadsbränder, samt att analysera hur denna roll varierar mellan olika typer av områden och om det finns samband med lokalsamhällestillit. Resultaten från båda delstudierna ger nya och viktiga insikter i hur spontan hjälp från personer i närområdet kan bidra till att minska konsekvenserna av bostadsbränder.

För det första visar resultaten att grannar och förbipasserande är betydelsefulla aktörer, framför allt i den tidiga fasen av brandförloppet, där de ofta är först med att upptäcka branden och larma räddningstjänsten. Deras roll i att påbörja släckningsinsatser är däremot mer begränsad. Dessa mönster varierar geografiskt – i tätbefolkade områden är det mer sannolikt att någon i närområdet agerar, medan ansvaret i glesbygdsområden i högre grad faller på de boende själva. Den fysiska närheten i flerfamiljshus och stadsområden verkar därmed utgöra en viktig förutsättning för snabba ingripanden.

För det andra framkommer att lokalsamhällestillit – särskilt social sammanhållning – har ett tydligt samband med om grannar och förbipasserande agerar i ett tidigt skede. Detta visar att kollektiva egenskaper i ett bostadsområde inte bara påverkar trygghetsupplevelser, utan också det faktiska beteendet i akuta situationer. Även om det inte fanns något samband mellan tillit och att påbörja släckning, indikerar resultaten att social tillit och gemensamma normer ökar benägenheten att larma och hjälpa till.

Resultaten har viktiga praktiska implikationer. För att stärka brandskyddet bör räddningstjänsten och andra myndigheter inte enbart fokusera på tekniska lösningar, utan även överväga insatser som stärker social sammanhållning och grannengagemang. Detta kan till exempel ske genom lokala kampanjer, samverkansinsatser eller ökad närvaro i områden där tilliten är låg. Det finns också behov av att utveckla former för att på ett tryggt och ansvarsfullt sätt uppmuntra allmänheten att ingripa – utan att utsätta sig själva för fara eller öka risken för onödiga larm.

Ett viktigt utvecklingsområde är att bättre förstå varför benägenheten att ingripa varierar mellan olika områden med liknande strukturella förutsättningar. Det behövs även mer kunskap om sambandet mellan faktisk ingripandeförmåga (t.ex. fysisk kapacitet, utrustning) och vilja att agera. Särskild uppmärksamhet bör riktas mot de mest sårbara grupperna, såsom äldre personer som bor ensamma, för vilka grannars och förbipasserandes agerande kan vara direkt livsavgörande.

Avslutningsvis visar denna studie att en stark tillit i lokalsamhället inte bara har betydelse för långsiktig trygghet utan även kan ha en omedelbar, livräddande effekt vid bostadsbränder. Genom att tillvarata och förstärka dessa resurser kan samhället komma ett steg närmare visionen om noll dödsfall i bostadsbränder.

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Save Thy Neighbour? Investigating how Neighbourhood Characteristics Affect the Identification, Alerting, and Extinguishing of Residential Fires

Finn Nilson, Rebecka Andersen and Ebba Henrekson

This study investigates how neighbourhood characteristics influence which actors identify residential fires, alert authorities, and initiate extinguishing efforts in Sweden. Using data from 12,829 residential fire incidents across 49 municipalities, the analysis highlights key roles played by residents, neighbours, and alarm systems. Residents most frequently detect, report, and begin extinguishing fires, though neighbours significantly contribute by detecting fires and alerting rescue services. Multinomial logistic regressions reveal that neighbour involvement is more common in densely populated areas with fewer foreign-born residents, whereas resident intervention is more frequent in areas with higher proportions of foreign-born individuals and fewer apartments. The findings emphasize a nuanced interaction between sociodemographic factors and community response in fire incidents, suggesting targeted strategies to improve fire safety in diverse and rural communities.

Background

Residential fire mortality rates[1,2] and residential fire rescue service responses[3] have generally declined over the past decades in developed countries. Three factors – or a combination thereof – may underlie these reductions: successful primary prevention (enhanced fire prevention efforts, including technical aids such as smoke alarms and fire extinguishers[4]; secondary prevention (more effective fire rescue operations); or tertiary prevention (improved care for injured individuals). However, despite these improvements and the reduction in risk overall in populations in developed countries, residential fire mortality still remains a considerable societal issue, although not necessarily for all. Rather, it is a societal risk strongly plagued by sociodemographic differences where the most vulnerable are by far the most at risk[1]. Not least, this is due to the fact that many mainstream prevention measures are not effective for all sociodemographic groups[5] with vulnerable individuals having difficulties in reacting to smoke alarms, handling fire extinguishing equipment, or evacuating.

In terms of fire prevention, the earlier a fire is identified and managed (either by extinguishing, calling for help, and/or evacuating), the greater the chances are that people caught in the fire survive. However, if individuals have difficulty accomplishing this themselves, outside help is required. Previous studies have shown that both individuals and societal actors are important in reducing the effects of fire[6], and that citizens often play a key role in detecting residential fires and alerting authorities[7], or assisting with evacuation[8]. Likewise, cohabitation reduces the risk of dying in a residential fire[9,10], with the protective effect likely linked to the presence of more individuals who can detect the fire, raise the alarm, extinguish it, or assist with evacuation[7].

Whilst there is considerable potential in individuals assisting others and thereby reducing fire mortality, certain underlying prerequisites are likely needed for people to be willing to intervene. For example, it is reasonable to assume that high population density increases the likelihood of neighbours or passers-by noticing and reacting to fires. However, while some studies have shown that residential fires are more common in rural areas[10], others have found that residential fire deaths are more prevalent in high-density areas—particularly in deprived neighbourhoods, areas with low educational levels, and areas with high poverty[11,12,13,14,15].

As such, although proximity should reduce the risk of fire mortality and increase the chances of quick intervention — not least because high-density areas typically have nearby rescue services, thereby minimising crucial response times[16] — having people close by does not appear to be sufficient. There also needs to be both a willingness and an ability to intervene among those nearby. In more deprived neighbourhoods, there is a higher concentration of individuals with at-risk sociodemographic characteristics (such as older adults, people living alone, individuals receiving social benefits, the unemployed, and those with low educational attainment)[10,17,18]. As a result, not only are these individuals more vulnerable themselves, but they may also lack the capacity to assist others. Likewise, although Sweden — along with other Nordic countries — belongs to a small group of high-trust nations globally[19,20], interpersonal trust varies considerably, with lower levels observed in socioeconomically disadvantaged areas[21]. This suggests a clear risk that in areas where more vulnerable individuals reside, there is also a reduced willingness to reach out or call for help.

However, these are purely hypotheses. It is currently not known how residential fires are handled, in terms of who identifies a fire, who alerts rescue services, and who starts extinguishing the fire. Not only are not the general patterns known, but it is also not known if the patterns or actors involved differ depending on the local context in terms of sociodemographic, societal, and geographical factors. Something this paper aims to contribute to.

To address these gaps, the study investigates the following research questions:

1. Who are the main actors involved in identifying, alerting, and extinguishing residential fires?
2. How do area-level characteristics influence who identifies residential fires, alerts the rescue services and initiates extinguishing efforts?
3. What patterns emerge in the combination of actors involved in identifying, alerting, and extinguishing residential fires?

Material and Methods

This study analyses how residential fires are handled and if the actors involved differs depending on the local context by drawing on two sources of data: (1) residential fire data from the Swedish Civil Contingencies Agency, and (2) register data on demographic statistical areas (Demografiska statistikområden, DeSO) from Statistics Sweden. DeSO are small geographic units in Sweden designed for detailed demographic and socioeconomic statistics, smaller than municipalities. Sweden has 5,984 DeSO districts, each varying between 700 and 2,700 residents.

Residential fire data

The first dataset includes all residential fires recorded in 49 of Sweden's 290 municipalities between 2018 and 2023, totalling 14,684 incidents. A total of 1,855 fire events were removed from the analysis because they did not occur in a residence but, for example, in the stairwell of an apartment building, a shared basement storage area, or an allotment cottage. This resulted in a final sample size of 12,829 fire events.

Using the text descriptions of each fire event, as detailed by the rescue services, we manually coded who detected the fire, who alerted authorities, and who made the initial efforts to extinguish it. All three co-authors took part in the manual coding. First, we examined the 50 first fire events together and developed a coding scheme of different types of actors. Then we each manually coded 100 events before meeting again to discuss definitions and hard-to-define cases. By keeping a continuous dialogue throughout the coding phase, we made sure that all co-authors had a shared understanding of how the coding should be carried out.

The coded actors for the identification category included a person in the residence, a neighbour or passer-by, a professional, the rescue services, a private security alarm, a public security alarm, and an automatic fire alarm. Since private and public security alarms cannot directly alert the rescue services, they were excluded from the coding of the alert category. For the category identifying who initiated fire suppression, the automatic fire alarm was also removed, while sprinkler systems and a "not applicable" code were added. The "not applicable" code was used for cases where the fire had either extinguished itself or where no actual fire had occurred.

The fire events dataset also included a variable ('Response time') indicating the time it took for the rescue services to arrive after being alerted. Before being used in the analysis, this variable was standardized to improve its suitability as a dependent variable in the regression models, as many of the other variables were scaled from 0 to 1.

DeSO level register data

To be able to analyse the context of the fire events, we used different variables aggregated to the DeSO district level.

Care need index (CNI). Is an index developed by Statistics Sweden (SCB) to identify the risk of ill health in a population. The CNI is calculated using a weighted sum of seven socioeconomic variables, where each variable is assigned a weight based on its correlation with healthcare needs. The formula is:

$$CNI = (w_1 \times X_1) + (w_2 \times X_2) + \ldots + (w_7 \times X_7)$$

where X_1 to X_7 represent the socioeconomic variables, and w_1 to w_7 are the corresponding weights. The seven variables include the proportion of individuals aged 65 or older living alone, the proportion of foreign-born individuals from Eastern Europe, Asia, Africa, and South America, the proportion of unemployed individuals or those in labor market programs (16–64 years), the proportion of single parents with children aged 17 or younger, the proportion of individuals (aged one year or older) who have recently moved into the area, the proportion of individuals aged 25–64 with low educational attainment, and the proportion of children younger than five years old. We use the CNI as a measurement of social vulnerability in our analysis of residential fire events, as it captures key socioeconomic factors—such as low income, unemployment, low education, and social isolation—that are associated with increased risk and disparities in emergency response outcomes.

Percent foreign background. The proportion of residents with a foreign background, defined as individuals who are either foreign-born or have two foreign-born parents.

Net income. The average disposable income per person after taxes and transfers, reflecting the financial resources available to residents. Similar to the response time variable, the income variable was standardized before being used in the analyses.

Percent university. The percentage of the population with at least three years of university level education.

Percent apartments. The proportion of residential dwellings that are apartments, as opposed to detached or semi-detached houses.

Percent special housing. The share of housing designated for specific needs, such as elderly care homes or other forms of supported living arrangements.

Urbanity is a categorical variable that describes the level of urbanity or rurality in a DeSO district. It includes four categories: *rural areas*, *towns*, *municipal centres*, and *metropolitan areas*. Rural areas consist of sparsely populated areas outside of towns and urban agglomerations. Towns refer to settlements or urban agglomerations that are not municipal centres. Municipal centres represent the administrative centres of municipalities, excluding the metropolitan areas of Stockholm, Gothenburg, and Malmö. Metropolitan areas encompass DeSO districts within Stockholm, Gothenburg, and Malmö.

The descriptive statistics for the independent variables are summarized in Table 1. For the descriptive tables and the regressions, we use a dataset with no missing values on any of the variables (n=12779).

Table 1. Descriptive statistics for independent variables

	Type	Mean	SD	Median	Percent
CNI	Scale	1.33	0.58	1.18	
Percent foreign background	Scale	0.31	0.24	0.24	
Standardized net income	Scale	0.02	1.0	-0.12	
Percent university	Scale	0.29	0.13	0.26	
Percent apartments	Scale	0.55	0.38	0.65	
Percent special housing	Scale	0.03	0.08	0.004	
Response time standardized	Scale	-0.01	0.73	-0.09	
Urbanity [rural areas]	Categorical				14.65%
Urbanity [semi-urban]	Categorical				6.21%
Urbanity [municipal centres]	Categorical				41.35%
Urbanity [metropolitan areas]	Categorical				37.79%

Analytical procedure

We start our analysis by showing descriptive data of the distribution of the actors that identifies, alerts the rescue services, and starts extinguishing in the event of a residential fire. Next, to examine factors associated with fire detection, notification, and extinguishing, we conducted a series of multinomial logistic regression analyses. These regressions allowed us to assess the relationships between key area-level characteristics and the likelihood that different actors were involved in discovering, alerting, and initiating fire suppression. Finally, we use descriptive statistics to analyse the distribution of different combination of actors.

Results

Who acts in residential fires

Starting with the distribution of who identifies, alerts, and starts extinguishing residential fires, as is seen in Table 2, a person in the affected residence is the most common actor in all three categories (45%, 41% and 33% respectively). However, despite being the most common, as is also clear, passers-by and neighbours are very often involved; particularly in identifying (29%) and alerting rescue services (31%). However, they are rarely the first to start extinguishing the fire (6%).

Rescue services are unsurprisingly very rarely involved in identifying and alerting rescue services. In terms of being the first to start to extinguish fires, in 33% of all fires no one had started extinguishing (note: in 19% of cases no intervention was required, often due to the reported fire being burnt food or similar).

Other categories worthy of mentioning are the different types of alarms. Automatic fire alarms – the most common alarm system in the dataset (7% identify and alert) – are alarms that directly alert rescue services and are only found in care homes for elderly people or those with disabilities. Public Security Alarms (1% identify) are alarm systems that are run by public authorities and are given to individuals who are assessed as vulnerable but still able to live in their own home, albeit with help. These alarms consist of a button on the person's wrist and require the person to actively press the button in order to speak to an operator (classed as professional in the Alert category). As such, they could be categorised in the “Person in the Residence” category. However, as these alarm systems simplify and assist the individual, they were categorised separately. Finally, Private Security Alarms (2% identify) are fire alarms, often with cameras, connected to security alarms that have been installed by the owner or proprietor of the property. These systems are automatically engaged by the connected fire alarm. An operator at the security company (classed as professional in the Alert category) then determines via the camera feed whether rescue services need to be alerted.

Table 2. Distribution of who identifies, alerts, and starts extinguishing residential fires

	Identify		Alert		Extinguish	
	n	%	n	%	n	%
Person in the Residence	5817	45%	5245	41%	4212	33%
Neighbours and Passers-by	3691	29%	4026	31%	755	6%
Professional Person	287	2%	722	6%	702	5%
Rescue Services	3	0%	3	0%	4261	33%
Private Security Alarm	303	2%				
Public Security Alarm	105	1%				
Automatic Fire Alarm	872	7%	872	7%		
Sprinkler System					35	0%
Not Applicable					2482	19%
Not Known	1751	14%	1961	15%	382	3%

Neighbourhood characteristics and intervention in residential fires

As a second step in the analysis, fires were analysed from the basis of who performed an intervention and the sociodemographic, geographical and societal characteristics of the area. To limit the analysis, only the largest categories were included. Moreover, Automatic Fire Alarm was also excluded as these only exist in special housing. As such, the characteristics of these areas are already known.

Starting with the identification of a residential fire, the actors Person in the Residence, Neighbours and Passers-by, Professional Person, and the Public and Private Security Alarms were studied further (Table 3). As is seen, the areas differ considerably from each other and can be summarised as follows:

- The likelihood of a *Person in the Residence* discovering the fire was higher in areas with a higher proportion of foreign-born individuals (OR = 5.66, $p < 0.001$) and in rural areas with a lower percentage of apartments (OR = 0.53, $p < 0.001$).
- Fires discovered by *Neighbours and Passers-by* were more common in areas with a lower proportion of foreign-born individuals (OR = 0.55, $p = 0.018$) and a higher percentage of apartments (OR = 3.70, $p < 0.001$).

Fires detected by *Private Security Alarms* were more likely in areas with a lower percentage of apartments (OR = 0.12, $p < 0.001$) and were less likely in rural areas, as indicated by their higher likelihood in municipal centres (OR = 2.44, $p < 0.001$) and city areas (OR = 2.29, $p = 0.006$).

- Fires detected by *Public Security Alarms* were less likely to occur in rural areas, as suggested by their higher likelihood in semi-urban areas (OR = 3.19, $p = 0.053$), although the model had limited explanatory power (Tjur $R^2 = 0.001$).
- Fires identified by a *Professional Person* were more common in areas with higher income (OR = 1.15, $p = 0.014$), a lower proportion of foreign-born individuals (OR = 0.11, $p = 0.008$), and in urban (OR = 2.79, $p < 0.001$) and city areas (OR = 3.18, $p = 0.001$).

In terms of alerting rescue services, the actors Person in the Residence, Neighbours and Passers-by, and Professional Person were included in the analysis. As is seen in Table 4, these areas also differed considerably from each other:

- Fires in which a *Person in the Residence* alerted the rescue services were more likely in areas with a higher proportion of foreign-born individuals (OR = 4.67, $p < 0.001$) and in areas with fewer apartments (OR = 0.41, $p < 0.001$). The likelihood was also lower in semi-urban areas (OR = 0.76, $p = 0.001$), municipal centres (OR = 0.56, $p < 0.001$), and city areas (OR = 0.53, $p < 0.001$). Additionally, a lower Care Need Index (CNI) was associated with a higher likelihood of a person in the residence alerting the rescue services (OR = 0.64, $p < 0.001$).
- Fires in which *Neighbours and Passers-by* alerted the rescue services were more likely in areas with a higher percentage of apartments (OR = 4.31, $p < 0.001$). No significant associations were found with foreign background, income, urbanicity, or other factors.
- Fires in which a *Professional Person* alerted the rescue services were more likely in semi-urban (OR = 2.16, $p < 0.001$), urban (OR = 2.95, $p < 0.001$), and city areas (OR = 3.43, $p < 0.001$). The likelihood was lower in areas with a higher percentage of apartments (OR = 0.42, $p < 0.001$).

Finally, in terms of starting to extinguish the fire, the actors included were Person in the Residence, Neighbours and Passers-by, Professional Person, and Rescue Services. Also, the category Not Applicable was included. As with the previous two analyses, these areas also differed (Table 5):

- The likelihood of a *Person in the Residence* initiating the extinguishing of the fire was higher in areas with fewer apartments (OR = 0.78, $p = 0.011$) and less special housing (OR = 0.28, $p < 0.001$). It was also higher in areas with a greater proportion of foreign-born individuals (OR = 5.16, $p < 0.001$) and higher levels of university education (OR = 1.83, $p = 0.033$), but lower in areas with higher CNI scores (OR = 0.62, $p < 0.001$).
- Fires in which *Neighbours and Passers-by* initiated extinguishing were not significantly associated with most predictors. There was a weak negative association with special housing (OR = 0.37, $p = 0.130$) and response time (OR = 0.75, $p = 0.094$), but neither reached statistical significance.
- Fires in which a *Professional Person* initiated extinguishing were more likely in areas with fewer apartments (OR = 0.58, $p = 0.005$) and less likely in areas with a greater proportion of foreign-born individuals (OR = 0.08, $p < 0.001$). The likelihood was also higher in areas with more special housing (OR = 5.45, $p < 0.001$) and lower with longer response times (OR = 0.66, $p = 0.037$).
- Fires in which Rescue Services initiated extinguishing were less likely in semi-urban areas (OR = 0.65, $p < 0.001$), municipal centres (OR = 0.59, $p < 0.001$), and city areas (OR = 0.65, $p < 0.001$), and less likely with longer response times (OR = 0.79, $p = 0.002$).

- Areas in which no extinguishing was required were more likely in urban (OR = 1.48, $p < 0.001$) and city areas (OR = 1.30, $p = 0.045$), more likely in areas with more apartments (OR = 1.43, $p = 0.002$) and more special housing (OR = 2.49, $p = 0.005$), and more likely with longer response times (OR = 1.20, $p = 0.016$).

Table 3. Logistic regression results predicting who identified the residential fire

	Person in the Residence			Neighbours and Passers-by			Private Security Alarm			Public Security Alarm			Professional person		
	OR	CI	p	OR	CI	p	OR	CI	p	OR	CI	p	OR	CI	p
(Intercept)	1.99	1.58 – 2.51	**<0.001**	0.18	0.14 – 0.23	**<0.001**	0.05	0.02 – 0.11	**<0.001**	0.00	0.00 – 0.01	**<0.001**	0.01	0.00 – 0.02	**<0.001**
Care Need Index (CNI)	0.60	0.48 – 0.75	**<0.001**	1.04	0.82 – 1.33	0.724	0.49	0.20 – 1.18	0.113	1.17	0.38 – 3.70	0.792	1.99	0.93 – 4.30	0.077
Net income (snd)	0.98	0.93 – 1.03	0.450	0.96	0.90 – 1.02	0.162	1.13	0.99 – 1.27	0.050	0.66	0.39 – 1.01	0.098	1.15	1.02 – 1.27	**0.014**
Percent foreign background	5.66	3.55 – 9.01	**<0.001**	0.55	0.33 – 0.90	**0.018**	3.10	0.53 – 17.60	0.206	0.62	0.06 – 6.40	0.690	0.11	0.02 – 0.55	**0.008**
Percentage university	1.70	1.00 – 2.89	**0.051**	1.15	0.64 – 2.06	0.647	1.26	0.25 – 6.24	0.780	2.11	0.10 – 42.63	0.629	0.92	0.18 – 4.85	0.924
Percent apartments	0.53	0.44 – 0.63	**<0.001**	3.70	3.02 – 4.54	**<0.001**	0.12	0.06 – 0.22	**<0.001**	0.81	0.30 – 2.21	0.679	0.91	0.51 – 1.63	0.753
Response time (snd)	1.01	0.95 – 1.07	0.644	0.98	0.88 – 1.04	0.589	0.74	0.45 – 1.07	0.224	0.62	0.20 – 1.11	0.365	1.01	NA – 1.08	0.908
Semi-urban	0.75	0.63 – 0.89	**0.001**	0.86	0.68 – 1.08	0.212	1.69	1.01 – 2.77	**0.039**	3.19	1.01 – 11.07	**0.053**	2.44	1.27 – 4.70	**0.007**
Municipal centres	0.56	0.48 – 0.65	**<0.001**	1.08	0.90 – 1.29	0.420	2.44	1.59 – 3.76	**<0.001**	2.40	0.82 – 8.17	0.129	2.79	1.60 – 5.04	**<0.001**
Metropolitan areas	0.53	0.44 – 0.65	**<0.001**	1.24	0.98 – 1.56	0.071	2.29	1.27 – 4.14	**0.006**	3.63	1.01 – 14.53	**0.056**	3.18	1.57 – 6.55	**0.001**
Number of observations	12779			12779			12779			12779			12779		
R^2 Tjur	0.041			0.048			0.023			0.001			0.003		

Table 4. Logistic regression results predicting who alerted rescue services in residential fire events

	Person in the Residence			**Neighbours and Passers-by**			**Professional person**		
	OR	CI	p	OR	CI	p	OR	CI	p
(Intercept)	1.91	1.51 – 2.42	**<0.001**	0.19	0.15 – 0.25	**<0.001**	0.04	0.03 – 0.07	**<0.001**
Care Need Index (CNI)	0.64	0.50 – 0.80	**<0.001**	0.97	0.77 – 1.23	0.814	0.90	0.55 – 1.49	0.685
Net income (snd)	1.00	0.94 – 1.05	0.883	0.97	0.92 – 1.03	0.284	1.07	0.97 – 1.16	0.157
Percent foreign background	4.67	2.90 – 7.52	**<0.001**	0.70	0.43 – 1.14	0.151	0.84	0.30 – 2.33	0.738
Percentage university	1.53	0.89 – 2.64	0.125	1.14	0.64 – 2.03	0.652	1.02	0.35 – 2.97	0.976
Percent apartments	0.41	0.34 – 0.49	**<0.001**	4.31	3.53 – 5.27	**<0.001**	0.42	0.29 – 0.61	**<0.001**
Response time (snd)	1.01	0.95 – 1.07	0.640	0.98	0.90 – 1.04	0.623	0.99	0.76 – 1.07	0.938
Semi-urban	0.76	0.64 – 0.90	**0.001**	0.84	0.67 – 1.05	0.131	2.16	1.47 – 3.15	**<0.001**
Municipal centres	0.56	0.49 – 0.65	**<0.001**	1.04	0.87 – 1.25	0.663	2.95	2.15 – 4.08	**<0.001**
Metropolitan areas	0.53	0.43 – 0.65	**<0.001**	1.21	0.97 – 1.52	0.096	3.43	2.26 – 5.21	**<0.001**
Number of observations	12779			12779			12779		
R2 Tjur	0.060			0.061			0.009		

Table 5. Logistic regression results predicting who initiated the extinguishing in residential fire events

	Person in the Residence			Neighbours and Passers-by			Professional person			Rescue Services			Not Applicable		
	OR	CI	p	OR	CI	p	OR	CI	p	OR	CI	p	OR	CI	p
(Intercept)	0.60	0.47 – 0.77	**<0.001**	0.06	0.03 – 0.09	**<0.001**	0.01	0.01 – 0.02	**<0.001**	0.69	0.54 – 0.88	**0.003**	0.16	0.12 – 0.21	**<0.001**
Care Need Index (CNI)	0.62	0.49 – 0.78	**<0.001**	0.93	0.59 – 1.48	0.774	2.79	1.72 – 4.52	**<0.001**	1.15	0.91 – 1.46	0.233	1.26	0.95 – 1.67	0.105
Net income (snd)	0.98	0.93 – 1.04	0.527	1.02	0.91 – 1.12	0.747	1.12	1.02 – 1.22	**0.014**	1.01	0.96 – 1.07	0.691	0.96	0.90 – 1.03	0.308
Percent foreign background	5.16	3.18 – 8.37	**<0.001**	1.46	0.56 – 3.79	0.438	0.08	0.03 – 0.22	**<0.001**	0.74	0.45 – 1.19	0.215	0.29	0.16 – 0.52	**<0.001**
Percentage university	1.83	1.05 – 3.19	**0.033**	1.12	0.37 – 3.33	0.843	0.71	0.24 – 2.14	0.543	0.78	0.45 – 1.37	0.389	0.92	0.48 – 1.78	0.806
Percent apartments	0.78	0.65 – 0.95	**0.011**	0.76	0.53 – 1.10	0.148	0.58	0.40 – 0.85	**0.005**	1.10	0.91 – 1.33	0.327	1.43	1.14 – 1.80	**0.002**
Response time (snd)	0.28	0.15 – 0.50	**<0.001**	0.37	0.09 – 1.25	0.130	5.45	2.20 – 12.95	**<0.001**	0.88	0.49 – 1.57	0.672	2.49	1.31 – 4.65	**0.005**
Semi-urban	1.01	0.95 – 1.07	0.578	0.75	0.53 – 1.01	0.094	0.66	0.44 – 0.96	**0.037**	0.79	0.68 – 0.92	**0.002**	1.20	1.04 – 1.40	**0.016**
Municipal centres	0.92	0.77 – 1.10	0.353	1.21	0.83 – 1.76	0.318	3.57	2.29 – 5.65	**<0.001**	0.65	0.54 – 0.78	**<0.001**	1.22	0.97 – 1.54	0.087
Metropolitan areas	0.91	0.78 – 1.05	0.199	1.16	0.84 – 1.62	0.362	3.58	2.37 – 5.54	**<0.001**	0.59	0.50 – 0.69	**<0.001**	1.48	1.22 – 1.81	**<0.001**
(Intercept)	0.87	0.71 – 1.07	0.190	1.36	0.89 – 2.07	0.156	4.45	2.70 – 7.42	**<0.001**	0.65	0.53 – 0.80	**<0.001**	1.30	1.01 – 1.67	**0.045**
Number of observations	12779			12779			12779			12779			12779		
R^2 Tjur	0.008			0.001			0.010			0.005			0.009		

Combination of actors in residential fire events

Whilst analysing the separate stages independently produces interesting and differing results, it is also clear from Table 6 that certain combinations of actors are much more common than others. Table 6 only includes the combinations with over 100 events, thereby excluding 2800 events that have combinations that are less common. In itself, this shows that event typologies follow a typical long-tail distribution with the top three combinations (Person in the Residence – Person in the Residence – Person in the Residence; Neighbours and Passers-by – Neighbours and Passers-by – Rescue Services; and Person in the Residence – Person in the Residence – Rescue Services) accounting for a total of 48% of all cases.

Table 6. Most common actor combinations for fire identification, alerting, and initial extinguishing in residential fires

Identification	Alerting	Start Extinguishing	Number of events	Percent
Neighbours and Passers-by	Neighbours and Passers-by	Neighbours and Passers-by	498	4%
Neighbours and Passers-by	Neighbours and Passers-by	Not Applicable	878	7%
Neighbours and Passers-by	Neighbours and Passers-by	Person in the Residence	353	3%
Neighbours and Passers-by	Neighbours and Passers-by	Rescue Services	1847	14%
Person in the Residence	Neighbours and Passers-by	Person in the Residence	243	2%
Person in the Residence	Person in the Residence	Not Applicable	739	6%
Person in the Residence	Person in the Residence	Neighbours and Passers-by	105	1%
Person in the Residence	Person in the Residence	Person in the Residence	3041	24%
Person in the Residence	Person in the Residence	Rescue Services	1267	10%
Professional person	Professional person	Professional person	143	1%
Private Security Alarm	Professional person	Rescue Services	101	1%
Automatic Fire Alarm	Automatic Fire Alarm	Not Applicable	243	2%
Automatic Fire Alarm	Automatic Fire Alarm	Person in the Residence	111	1%
Automatic Fire Alarm	Automatic Fire Alarm	Professional person	334	3%
Automatic Fire Alarm	Automatic Fire Alarm	Rescue Services	126	1%

The fact that the combination 'Person in the Residence – Person in the Residence – Person in the Residence' is the most common is noteworthy, as it suggests a relatively high proportion of residents possess the competence or equipment to begin extinguishing a fire. Typical situations include the occupant either needing help to extinguish the fire or requiring assistance to ensure it has been fully extinguished. Both scenarios are illustrated in the following quote:

> A person reports that there has been a fire on the stove and in the spice cabinet above it. They don't know if the fire has spread into the ventilation; they believe they have extinguished it but

> want us to come and check. While en route, the person calls again and informs us that the smoke development has increased on the upper floor.

The second most common combination, when a fire has been identified by occupants, is 'Person in the Residence – Person in the Residence – Rescue Services.' This is unsurprising, given that the data is collected by the rescue services. However, these fires differ from those in the category above. Many involve locations that are difficult to access or extinguish—such as roofs, chimneys, or heating systems—as illustrated in the following quote:

> The cause is unclear, but the geothermal heat pump has caught fire, and smoke is spreading from the boiler room upwards in the building. The man in the household notices the smoke, determines its source, and alerts the authorities.

Alternatively, the fire may be too large for the occupants to handle:

> A man sees that a fire has started on his balcony. He opens the balcony door to extinguish it but then closes it again. He feels that the fire is too intense for him to put out. The man goes down to the stairwell and calls 112.

Regarding the second most common chain overall—'Neighbours and Passers-by – Neighbours and Passers-by – Rescue Services'—there are also some typical scenarios. One such situation occurs when a fire is spotted by a neighbour or passer-by, but they are unable to contact anyone inside the home, prompting a call to the rescue services. This is illustrated in the following quotes:

> A passer-by hears a smoke alarm and smells smoke, then calls 112. The caller sees that there is a fire in an apartment and on the balcony. During the call, they also notice that it is spreading quickly.

> The apartment resident started cooking in a saucepan and turned on the heat on the stovetop. They then forgot about the saucepan and went to bed, which led to smoke development. A passer-by sees heavy smoke through the window and calls emergency services.

A similar, yet slightly different scenario arises when neighbours or passers-by smell smoke but are unable to identify where it is coming from. For example: *“Several callers notice the smell of smoke in the area. No visible flames. No one can determine the source of the smoke.”*

The fourth most common combination—'Neighbours and Passers-by – Neighbours and Passers-by – Not Applicable'—is particularly noteworthy. These cases involve situations where a neighbour or passer-by contacts the rescue services, but upon arrival, there is no actual fire to extinguish. Such incidents often reflect a hesitation to engage directly with the occupant. Typically, the neighbour or passer-by smells something burnt and alerts emergency services without first checking whether anyone is home or what might have caused the smell, as exemplified by this quote: *“A person was cooking in their kitchen and forgot the food in the oven, resulting in burnt food and a smell of smoke. A neighbour called emergency services, concerned about the smoke.”*

Quite often, these cases involve an occupant who has fallen asleep or left the home while cooking. As one account notes: *"Cooking in the middle of the night, got tired and lay down on the bed, fell asleep*." Another describes a similar situation: "*Someone was cooking, left the apartment with the stove set to the highest level. A frying pan was left on the stove*."

In addition to highlighting typical incident types, Table 6 reveals another important finding: when neighbours or passers-by are involved in responding to a residential fire, their role is clearly centred on detection and alerting the rescue services. Notably, a significantly larger proportion of fires identified by neighbours or passers-by are extinguished by rescue services—approximately half—compared to fires identified by residents themselves. In contrast, when residents are the first to detect the fire, they initiate extinguishing efforts in about 56% of cases, while rescue services are first to act in just 23%. Furthermore, the most common type of incident where rescue services are the first to begin extinguishing is one that has been identified and reported by neighbours or passers-by.

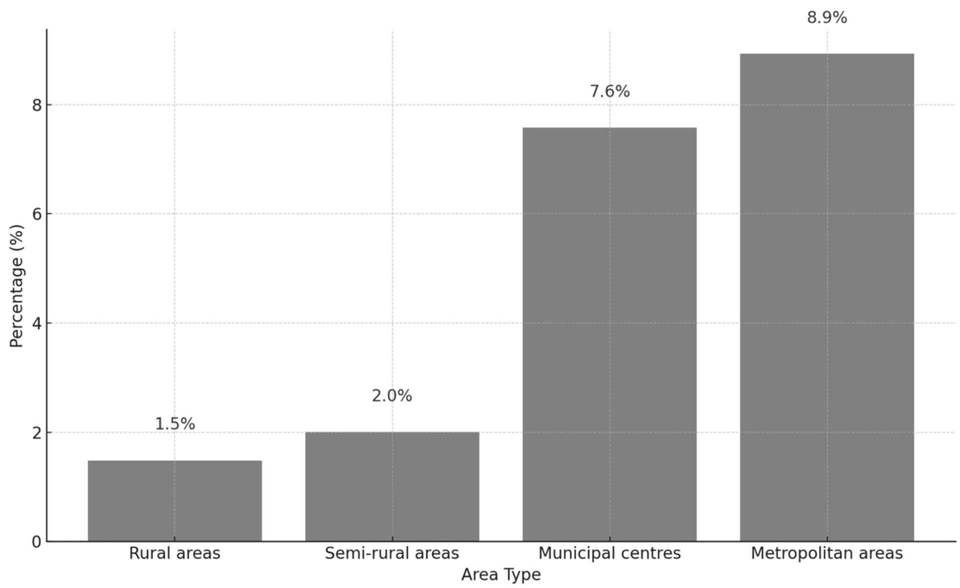
Discussion

From the perspective of the role of neighbours or passers-by, the analysis in this paper shows several interesting and noteworthy results. First, neighbours or passers-by clearly play an important role in secondary fire prevention, i.e., identifying fires and alerting authorities (and to some extent the people in the residency) who can then extinguish the fire and thereby reduce the risk of casualties and financial damage. To a much lesser extent, neighbours or passers-by are active in extinguishing fires. In fact, it is more common that fires that are identified and alerted by neighbours or passers-by lead to not needing any extinguishing (878 fires) than they themselves extinguishing (498 fires).

The fact that a quarter of the fires that were phoned in by neighbours and passers-by were not applicable for extinguishing is noteworthy. As previously noted, the coding of the data revealed that neighbours or passers-by often reported the smell of smoke to authorities without knocking on the door or attempting to contact the occupants. In many of these cases—those coded as 'not applicable'—there was no actual fire, but rather burnt food or a similar harmless source. This reluctance to try to reach the at-risk individual is problematic from two perspectives. First, if it is a household fire, then the time saved by intervening before rescue services arrive can be critical. Second, in cases where extinguishing wasn't required—and this could have been discovered before alerting authorities—considerable costs could have been avoided by not engaging rescue services.

This hesitation to engage more directly in the situation is interesting and can be theorized to relate to distinctly Swedish manners. Much has been written about the independence of Swedes and their reluctance to get involved in other people's affairs—an attitude that Berggren and Trägårdh[22] refers to as "state individualism". This concept highlights the unique balance in Swedish society between strong individual autonomy and a reliance on the state, rather than on interpersonal obligations or community intervention. Moreover, Swedes are renowned for their strong trust and reliance on public authorities[23]. Therefore, whilst only hypothetical, it can easily be imagined that this pattern of events could illustrate a desire for Swedes to do one's duty but not get personally involved.

Figure 1. Percentage of fires in different types of areas that are discovered and reported by neighbours and passers-by and then classified as extinguish not applicable



The results show that neighbours and passers-by more often identify residential fires and alert the rescue services in areas with more apartments and less individuals with a foreign background. The fact that neighbours or passers-by are considerably more likely to involve themselves in fires that occur in more densely populated neighbourhoods indicates that proximity to other people increases the likelihood that fires will be detected by someone outside of the household. However, given the large number of fires in metropolitan areas and municipal centres (see Figure 1) that were reported by neighbours or passers-by and then classified as "extinguish non applicable", there is evidence to suggest that these are smaller fires. As such, it could be that fires that are reported to rescue services in rural areas are larger and that fires of smaller size in rural areas are likely handled without rescue services being alerted and thereby not included in the dataset. This is further supported by the fact that rescue services more often extinguish fires in rural areas, despite previous Swedish studies showing a greater level of fire protection in rural areas compared to urban areas[6,24].

A final noteworthy finding concerns the role of private security alarms. The most common chain involving these systems is 'Private Security Alarm – Professional Person – Rescue Services'—in other words, the alarm notifies a professional operator who identifies the fire through a surveillance camera and then contacts the rescue services The data shows that fires detected by private security alarms are more common in semi-urban areas, municipal centres, and towns, compared to rural areas and those with fewer apartment buildings. This suggests that such alarms are primarily installed in houses located in suburban or urban neighbourhoods. In many ways, private security alarms mirror the role of neighbours or passers-by—acting as an extra pair of eyes or ears—but in a different geographical context. Both function as backup observers who help compensate for any delay or inaction of residents.

Whether a similar control system exists in rural areas is difficult to determine. However, since residents themselves are far more likely to both detect the fire and alert rescue services—compared to neighbours, passers-by, or automatic alarms—it appears that this kind of compensating mechanism is largely absent in rural settings. This could help explain why the risk of fire-related mortality is greater in rural areas[10], alongside longer rescue service response times given the critical importance of rapid intervention[16].

This highlights the importance of developing both technical and social interventions—such as personal security alarms or neighbourhood watch programs—to help reduce risk for individuals living in rural areas. While there is a risk of false alarms, as seen in some interventions by neighbours and passers-by, this is generally preferable to the alternative. Still, there is clear potential for more public education—for instance, teaching neighbours and passers-by how to assess a potential residential fire event more carefully before alerting the authorities.

There are several limitations to the present study. First, it is based on incident reports from rescue services, which, although systematically collected, are not without limitations. These reports may not capture all residential fires, particularly minor incidents resolved without official intervention, which introduces a potential selection bias toward more severe or externally detected fires. Furthermore, the level of detail and consistency in reporting can vary between municipalities, potentially affecting the comparability of the data. Second, while actor involvement was carefully coded through a collaborative and iterative process, the coding relied on free-text descriptions written by rescue personnel. As such, some subjectivity in interpretation was inevitable, and borderline cases may have been classified differently depending on wording or context. Despite efforts to ensure inter-coder reliability, this introduces a risk of measurement error. Third, the generalizability of the findings is limited by the study's geographic scope. The analysis includes 49 municipalities in Sweden, a high-trust Nordic country with relatively strong institutional infrastructure. As a result, the patterns observed here may not fully translate to other national contexts with differing levels of social trust, fire safety infrastructure, or emergency response systems.

Conclusions

In conclusion, this study has shown that neighbours and passers-by play an important role in identifying residential fires and alerting rescue services. However, their involvement appears to be more common in areas with higher proportions of ethnic Swedes and apartment buildings. In more suburban settings, this role is often filled by private alarm systems. In contrast, in rural areas and in neighbourhoods with greater ethnic diversity, the responsibility for identifying and reporting fires tends to fall more heavily on the residents themselves.

Future research should explore whether these patterns are unique to Sweden or reflect broader international trends. From a practical standpoint, targeted strategies are needed to address vulnerabilities in rural and ethnically diverse areas. Additionally, there is a need for thoughtful discussion on how rescue services can encourage neighbours and passers-by to intervene appropriately—striking a balance that supports early detection while minimizing unnecessary call-outs.

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Investigating the role of neighbors and passersby in residential fire prevention – trust and collective efficacy

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This study investigates the role of neighbors and passersby in residential fire response as an objective indicator of collective efficacy. Drawing on survey data from 302 statistical areas in Sweden and 1885 fire incident reports, we examine whether higher levels of collective efficacy are associated with early community intervention during fires. We find that in areas with higher perceived collective efficacy, residents are more likely to detect fires and alert rescue services, though not to initiate suppression efforts. Importantly, the study incorporates both urban and rural contexts, showing that while physical proximity matters, social proximity plays a key role in shaping spontaneous action. These findings provide novel, objective support for the practical relevance of collective efficacy in disaster response and highlight the importance of context in community-based prevention efforts.

Introduction

When residential fires break out, the time between ignition and emergency response can be decisive. In these critical moments, neighbors and passersby can play an important role in detecting the fire and alerting the rescue services. While emergency services are central to fire safety, spontaneous actions by community members can make the difference between a contained incident and a fatal disaster. Yet, despite their importance, these forms of everyday intervention remain largely invisible in both research and public policy.

This study investigates the role of neighbors and passersby in fire prevention efforts, focusing on how collective efficacy influences individuals' willingness to intervene and cooperate in the context of residential fires. While the concept of collective efficacy is well established in the literature, particularly in the domains of crime prevention (Mazerolle, et al. 2010; Sampson, et al. 1997; Hipp, 2016) and community resilience (Kadetz, 2018), it remains underexplored in the context of disaster and fire prevention. We intend to extend this theoretical framework by examining whether collective efficacy – defined as social cohesion, trust, and shared expectations for action within a community – can predict active participation in fire prevention, encompassing a broader sense of community cooperation.

A common critique of collective efficacy is its reliance on subjective measures, particularly self-reported data, which can be prone to biases, such as social desirability or inaccuracies in recall (Hipp, 2016). Since collective efficacy involves individuals' perceptions of social trust, cohesion, and willingness to engage in collective action, surveys or interviews often assess it. These subjective measurements, while valuable, may not always accurately reflect actual behaviors or outcomes in real-world situations. In this study, we seek to address this concern by testing whether residents' self-reported perceptions of collective efficacy align with observable behaviors in fire prevention efforts. Specifically, we will examine whether individuals’ assessments of their neighborhood's collective efficacy correspond to data on the actual actions taken by neighbors and passersby in fire-related situations.

By comparing subjective self-reports with objective observations of behavior, this study aims to assess the validity and predictive power of the collective efficacy construct within the context of fire safety, offering insights into the practical utility of collective efficacy in promoting community-based disaster prevention. Moreover, many studies on collective efficacy have focused primarily on urban environments, where concerns about crime and neighborhood disorder have traditionally driven research interest (Gerell and Kronkvist, 2017; Mazerolle, et al. 2010; Sampson, et al. 1997; Sampson and Wikström, 2008). In contrast, our study includes both rural and urban communities, offering a broader perspective on how collective efficacy functions across diverse local contexts. The study seeks to answer three research questions:

1. To what extent do neighbors and passersby contribute to fire prevention efforts?
2. How can collective efficacy explain differences between geographic areas?
3. Do demographic differences correlate with the likelihood of spontaneous interventions?

The study is conducted in Sweden, a country known for its high levels of trust compared to many other countries (WVS). However, significant differences exist across various regions, with some areas exhibiting high trust and others displaying lower levels (Wallman Lundåsen & Wollebaek, 2013). By utilizing an extensive survey on trust and collective efficacy, spanning a wide range of urban and rural settings in Sweden, alongside official reports on fire incidents, we are able to cross-examine the relationship between collective efficacy and fire prevention efforts undertaken by neighbors and passersby.

The Role of Spontaneous Community Action in Fire Emergencies

Previous research has highlighted the significant role that citizens play in emergency situations, particularly in detecting crises and alerting authorities (Runefors, 2020), as well as assisting with evacuations (Runefors et al., 2021). In the context of a residential fire, the timing of interventions is crucial (Jaldell, 2015). Spontaneous actions from neighbors, passersby, and other individuals nearby can substantially reduce the time between fire detection and the initiation of firefighting efforts, thus contributing to the achievement of the "zero vision" for residential fires (Andersson & Gell, 2023). Despite the apparent importance of such spontaneous interventions, the extent and nature of these actions have not been extensively studied. As a result, it remains unclear whether spontaneous interventions are more prevalent in certain geographic areas and whether factors such as demographic differences and collective efficacy can help explain these variations.

For individuals to be willing to intervene, certain underlying factors likely come into play. It is well-established that residential fire fatalities are more prevalent in certain geographical areas—for example in, deprived neighborhoods, as well as in areas characterized by lower educational levels, higher poverty rates, overcrowding, and rural settings (Runyan, Bangdiwala et al., 1992; Jennings, 1999; Duncanson, Woodward et al., 2002; Holborn, Nolan et al., 2003; Shai & Lupinacci, 2003; Jonsson & Jaldell, 2020). While the increased risk in some of these areas can be theoretically attributed to a higher concentration of at-risk sociodemographic factors – such as male gender, advanced age, living alone, low socio-economic status, or low educational attainment (Marshall, Runyan et al., 1998; Hastie & Searle, 2016; Jonsson & Jaldell, 2020) – this heightened risk could also reflect other dimensions, such as a lack of intervention from neighbors, passersby, or other nearby individuals.

Previous research supports such a hypothesis: attributing the heightened odds of survival in urban areas in Sweden to the actions taken by neighbors and passersby (Runefors, et al. 2021). The underlying reasoning is that the close proximity to others means that fires are discovered more easily and earlier. However, not all urban or high-density areas have low fire mortality rates (Turner et al, 2017) meaning that other underlying factors – unrelated to geographical proximity – may play a crucial role in explaining mortality patterns.

Collective Efficacy in Broader Contexts

Collective efficacy, which combines social cohesion and shared expectations for collective action, could play a significant role in fire prevention. Although collective efficacy has a long history in some research fields, such as crime prevention (Gerell and Kronkvist, 2017; Hipp, 2016; Mazerolle, et al. 2010; Sampson, et al. 1997; Sampson and Wikström, 2008), community resilience (Kadetz, 2018) and education (Klassen et al., 2011; Goddard et al., 2004), it has received limited attention in other research fields, such as disaster risk research (Babcicky & Seebauer, 2020).

In the field of education, collective efficacy, along with two other forms of efficacy: students' self-efficacy and teachers' beliefs in their instructional efficacy, is used to explain variations in educational outcomes. Previous studies have shown that higher levels of these efficacy beliefs are associated with improved performance (Goddard et al., 2004). In the context of crime prevention, collective efficacy seeks to explain why certain neighborhoods experience higher rates of crime than others. The theory posits that when neighbors are willing to intervene, it helps prevent crime on a larger scale. While social control alone may lead to a policing of behaviors, adding social trust to the equation means people act because they trust one another. In Sweden, most research on collective efficacy has focused on urban neighborhoods, particularly in major cities like Malmö and Stockholm (Gerell and Kronkvist, 2017; Sampson and Wikström, 2008). However, these studies often rely on cross-sectional data and lack longitudinal analysis of individual trajectories. Community resilience to disasters has frequently been examined through the lens of social capital (Cutter et al., 2003; Aldrich & Meyer, 2015), which includes shared norms, trust, networks, and visible assistance among community members (Adger, 2003; Norris et al., 2008). While collective efficacy also addresses social cohesion and trust within a community, its distinct value lies in its focus on specific collective actions aimed at achieving particular objectives.

As Sampson et al. (1997) note, “the willingness of local residents to intervene for the common good depends in large part on conditions of mutual trust and solidarity among neighbors” (p. 919). One challenge, however, is that informal social control is typically only visible during moments when the social order is threatened. In these instances, residents’ potential responses are often hypothetical or latent. A key assumption in the neighborhood collective efficacy literature is that the norms and attitudes within a community that foster a sense of collective efficacy will eventually translate into actual informal social control behaviors. As Sampson et al. (2006) argue, “[s]ocial movements and collective efficacy theory share a common orienting framework – a focus on the mobilization of action for an intended purpose” (p. 4). Through this study, we have the opportunity to test the predictive power of collective efficacy in relation to fire prevention efforts.

Study Design and Method

The study is based on the Trust Barometer survey, covering 49 (out of 290) municipalities in Sweden. The survey collects data on collective efficacy and community trust. In addition, fire department reports from the same 49 municipalities for the years 2018–2024 were analyzed, with a focus on who detected the fire, who alerted authorities, and who made the initial efforts to extinguish it. This allows us to examine the extent to which neighbors and passersby played an active role in responding to the fire. In addition, we use register data on demographic statistical areas (Demografiska statistikområden, DeSO) from Statistics Sweden. DeSO districts are small geographic units in Sweden designed for detailed demographic and socioeconomic statistics, smaller than municipalities. Sweden has 5,984 DeSO districts, each varying between 700 and 2,700 residents. In the analysis, we use data from 1885 residential fire events in 302 DeSO areas.

Residential fire records

The dataset on fire department reports includes all residential fires recorded in the 49 municipalities between 2018 and 2023, totaling 14,684 incidents. Using text descriptions of each fire event, we manually coded who detected the fire, who alerted authorities, and who made the initial efforts to extinguish it. This allows us to identify whether the actor in each stage of the fire event was a neighbor or passerby, a resident, a professional, a technical solution, or the fire department. In the final stage—initial efforts to extinguish the fire—we also used the code “not applicable” for cases where the fire had either self-extinguished or never actually occurred. A total of 1,854 fire events were removed from the analysis because they did not occur in a residence but, for example, in the stairwell of an apartment building, a shared basement storage area, or an allotment cottage. This resulted in a final sample size of 12,830 fire events.

All three co-authors took part in the manual coding. First, we examined the 50 first fire events together and developed a coding scheme of different types of actors. Then we each manually coded 100 events before meeting again to discuss definitions and hard to define cases. By keeping a continuous dialogue throughout the coding phase, we made sure that all co-authors had a shared understanding of how the coding should be carried out.

In the 302 DeSO areas included in the study, we have a total of 1885 residential fire events. Thus, for the current study we use a subset of all residential fires in the 49 municipalities. Table 1 shows the distribution of actors taking action during the different phases of the fire event.

Table 7. Distribution of actors taking action during the different stages of the fire events

	Detect	Detect Percent	Alert	Alert percent	Distinguish	Distinguish percent
Neigbor/passerby	452	24%	482	26%	103	5%
Person in residence	874	46%	812	43%	594	32%
Technical solution	227	12%	125	7%	1	0%
Professional	49	3%	165	9%	94	5%
Rescue services		0%		0%	675	36%
Not applicable		0%		0%	359	19%
Unknown	283	15%	301	16%	59	3%
Total	1885	100%	1885	100%	1885	100%

Aggregates measures of trust and collective efficacy

To construct our main independent variables, we use data from the 2020 and 2024 wave of the Trust Barometer survey. The respondents from 2020 were selected from both the second wave of a panel (initiated in 2017) and a representative sample from the 49 municipalities. The 49 municipalities included in the Trust Barometer were purposefully selected to ensure representation of Sweden as a whole, based on factors such as foreign-born residents, socioeconomic inequality, religious participation, and crime rates. In 2020, the response rate was 75 percent for individuals in the panel and 34.1 percent for those in the representative sample. We added respondents from a nationally representative sample of respondents from 2024 (with a response rate of 29.7%). However, since the respondents in 2020 came from only the 49 municipalities and the 2024 respondents came from a nationally representative sample, the aggregated measures of collective efficacy and trust are overwhelmingly derived from the 2020 respondents. The surveys, distributed by Statistics Sweden, were available in both paper and web-based formats, with three reminders sent to non-respondents. The questionnaire covered a wide range of topics, including trust, collective efficacy, safety, and welfare, as well as questions on risk perception.

We set a lower bound cutoff limit of 18 respondents per DeSO to ensure the stability of aggregated measures of collective efficacy. In total, we included aggregated measures of collective efficacy from

10,610 respondents across 302 DeSO areas. The number of respondents per geographical unit in our study is in line with previous research, such as Sampson et al. (1997), who analyzed data from 8,782 respondents across 343 neighborhoods in Chicago. Similarly, Gerell & Kronkvist (2017) examined collective efficacy in Malmö, Sweden, using survey data from 4,051 respondents across 96 neighborhoods, with a minimum of 20 respondents per neighborhood included in their analysis.

The Collective Efficacy Index consists of two sub-scales, with each subscale including five items measured on a Likert scale (Sampson et al., 1997), that have been combined into a single index measuring the level of collective efficacy at the DeSO district level. The first sub-scale is designed to measure the social cohesion in a neighborhood. It includes questions about mutual helpfulness, interpersonal harmony, trust, cooperation, and shared values among residents. The second subscale is designed to measure neighborhood social control. It includes questions about how likely residents are to intervene in various situations that signal social disorder, such as children skipping school and spending time in the neighborhood during school hours, graffiti vandalism, disrespectful behavior toward adults, fights or serious threats near their homes, and attempted car break-ins.

To construct the sub-scales, we calculated each respondent's mean by summing their answers to the subscale items and dividing by five. The Cronbach's alpha value was 0.810 for the social cohesion subscale and 0.874 for the social control subscale, indicating good internal consistency for both measures. We then created the collective efficacy index by summing the two subscales and dividing by two. The Cronbach's alpha for the combined index was 0.858. Given this, we use both the combined collective efficacy index and the individual subscales in our analyses: the combined measure provides a holistic indicator of neighborhood social dynamics, while the subscales allow for a more nuanced examination of social cohesion and social control as distinct dimensions.

Finally, we calculated the aggregated measures for the subscales and the collective efficacy index at the DeSO level by summing the individual scores within each DeSO and dividing by the number of respondents in that district.

Register data from Statistics Sweden

Since our independent variables are aggregated at the DeSO level, adding too many controls would reduce the degrees of freedom, as we have only 302 unique DeSO units despite having 1,885 fire event records. To ensure model stability and interpretability, we limit the number of DeSO-level controls to avoid overfitting and maintain statistical power. Still, we added various DeSO-level control variables from Statistics Sweden for the year 2020 to our dataset to account for socioeconomic and demographic factors that might influence collective efficacy and trust. Specifically, we added mean income, the percentage of residents with a university education, the percentage of foreign-born residents, and the urban-rural character of the area.

Percent foreign background. The proportion of residents with a foreign background, defined as individuals who are either foreign-born or have two foreign-born parents.

Net income. The average disposable income per person after taxes and transfers, reflecting the financial resources available to residents. Before being used in the analysis, this variable was standardized to improve its suitability as a dependent variable in the regression models, as many of the other variables were scaled from 0 to 1.

Percent university. The percentage of the population with at least three years of university level education.

Urbanity is a categorical variable that describes the level of urbanity or rurality in a DeSO district. It includes for categories: *rural areas*, *towns*, *municipal centers*, and *metropolitan areas*. Rural areas consist of sparsely populated areas outside of towns and urban agglomerations. Towns refer to settlements or urban agglomerations that are not municipal centers. Municipal centers represent the administrative centers of municipalities, excluding the metropolitan areas of Stockholm, Gothenburg, and Malmö. Metropolitan areas encompass DeSO districts within Stockholm, Gothenburg, and Malmö.

Table 2 provides the descriptive statistics for all independent variables included in the analysis.

Table 8. Descriptive statistics for independent variables included in the analysis

	Type	Mean	SD	Median	Percent
Collective efficacy	Scale	2.24	0.26	2.26	
Social control	Scale	2.34	0.30	2.31	
Social cohesion	Scale	2.23	0.26	2.18	
Percent foreign background	Scale	0.26	0.19	0.20	
Standardized net income	Scale	- 0.07	0.64	-0.19	
Percent university	Scale	0.24	0.19	0.12	
Urbanity [rural areas]	Categorical				22.8%
Urbanity [towns]	Categorical				5.1%
Urbanity [municipal centers]	Categorical				40.0%
Urbanity [metropolitan areas]	Categorical				32.1%

Analytical procedure

In this article, we examine the role of neighbors and passersby in residential fires in relation to collective efficacy using multilevel logistic regression models. We fit three regression models with dummy variables as the dependent variables, indicating whether a neighbor or passerby (1) detected the fire, (2) alerted the authorities, and (3) initiated efforts to extinguish it, and the collective efficacy index as the main dependent variable. In addition, we run three additional regression models with the same dependent variables but use the two subscales for social cohesion and social control as the main independent variables.

Results

As seen in Table 1, neighbors and passersby detected 24 percent of the residential fires, alerted the authorities in 26 percent of the cases and made initial efforts to distinguish the fires in five percent of the cases. That is, neighbors and passersby play an important role in early fire detection and, to a lesser extent, contribute to initial fire suppression efforts. We now move on to analysis the specific environments where neighbors and passersby are more likely to take action.

Bivariate correlations

The initial bivariate correlation analysis presented in Table 3 indicates that whether a neighbor or passerby detected the fire or alerted the authorities are highly correlated with each other. Furthermore, there is a positive relationship between these two variables and collective efficacy and the two subscales as well as the level of urbanity (here included as a numerical variable with higher values indicating higher urbanization), the percent of individuals in a community with a foreign background, and the percent of individuals with a university degree. The variable indicating if a neighbor or passerby initiated the fire suppression efforts is not significantly correlated with any of the included variables except detect and alert.

Interestingly, collective efficacy at the DeSO level is positively correlated with a higher proportion of the population being of foreign descent, while it is negatively correlated with mean net income—a pattern that contrasts with findings from previous studies (see e.g., Mazerolle et al, 2010; Sampson et al, 1997). Moreover, collective efficacy is positively correlated with more urban areas.

Table 3. Bivariate correlation matrix (Pearson's r)

	1	2	3	4	5	6	7	8	9
1. Detect	1.00								
2. Alert	0.93***	1.00							
3. Extinguish	0.25***	0.24***	1.00						
4. Net income	-0.03	-0.05*	0.02	1.00					
5. Percent foreign	0.09***	0.11***	0.03	-0.39***	1.00				
6. Percent university	0.08***	0.06**	0.04	0.67***	0.00	1.00			
7. Urbanity	0.12***	0.14***	0.03	0.05*	0.64***	0.46***	1.00		
8. Collective efficacy	0.12***	0.14***	-0.02	-0.42***	0.79***	0.00	0.56***	1.00	
9. Social control	0.11***	0.12***	-0.02	-0.38***	0.74***	0.00	0.53***	0.95***	1.00
10. Social cohesion	0.13***	0.14***	-0.01	-0.43***	0.76***	-0.00	0.53***	0.94***	0.79***

Note. *p ≤ .05, **p ≤ .01, ***p ≤ .001.

Multilevel logistic regression models – Collective efficacy

As our next step in the analysis, three multilevel logistic regression models were used to examine the relationship between actions taken by neighbors and passersby in fire-related situations and collective efficacy at the DeSO district level. Table 4 shows the results from the three models, using dummy variables as the dependent variables, indicating whether a neighbor or passerby (1) detected the fire, (2) alerted the authorities, and (3) initiated efforts to extinguish it.

Table 4. Results from multilevel logistic regression analysis

	Detect			Alert			Extinguish		
Predictors	*OR*	*CI*	*p*	*OR*	*CI*	*p*	*OR*	*CI*	*p*
(Intercept)	0.02	0.00 – 0.09	**<0.001**	0.02	0.00 – 0.09	**<0.001**	1.14	0.08 – 15.42	0.919
Collective efficacy	2.64	1.20 – 5.80	**0.016**	2.56	1.16 – 5.64	**0.020**	0.17	0.05 – 0.60	**0.006**
Standardized net income	0.72	0.52 – 1.00	0.051	0.67	0.48 – 0.95	**0.022**	0.94	0.57 – 1.53	0.793
Percent university	11.30	1.53 – 83.27	**0.017**	10.44	1.39 – 78.59	**0.023**	3.42	0.14 – 81.88	0.447
Percent foreign background	0.50	0.14 – 1.86	0.303	0.59	0.16 – 2.19	0.431	10.43	1.27 – 85.77	**0.029**
Urbanity [rural areas] (ref.)									
Urbanity [towns]	0.66	0.32 – 1.35	0.255	0.72	0.35 – 1.46	0.357	1.91	0.79 – 4.59	0.150
Urbanity [municipal centers]	1.40	0.96 – 2.05	0.078	1.51	1.03 – 2.21	**0.034**	1.03	0.55 – 1.96	0.916
Urbanity [metropolitan areas]	1.35	0.68 – 2.66	0.389	1.41	0.71 – 2.80	0.324	1.15	0.38 – 3.45	0.804
Random Effects									
σ^2	3.29			3.29			3.29		
$\tau_{00\ \mathrm{DeSO}}$	0.16			0.19			0.00		
ICC	0.05			0.06			0.00		
N_{DeSO}	302			302			302		
Observations	1885			1885			1885		
Marginal R^2 / Conditional R^2	0.048 / 0.092			0.053 / 0.106			0.038 / NA		

Table 5. Results from multilevel logistic regression analysis

	Detect			Alert			Distinguish		
Predictors	*OR*	*CI*	*p*	*OR*	*CI*	*p*	*OR*	*CI*	*p*
(Intercept)	0.01	0.00 – 0.08	**<0.001**	0.02	0.00 – 0.08	**<0.001**	0.91	0.07 – 12.75	0.946
Social control	1.15	0.56 – 2.33	0.705	1.05	0.51 – 2.13	0.899	0.34	0.10 – 1.13	0.079
Social cohesion	2.49	1.05 – 5.92	**0.039**	2.69	1.13 – 6.42	**0.026**	0.57	0.14 – 2.40	0.443
Standardized net income	0.73	0.53 – 1.02	0.067	0.69	0.49 – 0.97	**0.030**	0.95	0.58 – 1.55	0.841
Percent university	11.04	1.51 – 80.97	**0.018**	10.23	1.37 – 76.37	**0.023**	3.36	0.14 – 80.68	0.454
Percent foreign background	0.50	0.14 – 1.86	0.302	0.59	0.16 – 2.17	0.424	10.08	1.22 – 83.30	**0.032**
Urbanity [rural areas] (ref.)									
Urbanity [towns]	0.66	0.32 – 1.35	0.257	0.73	0.36 – 1.47	0.374	1.90	0.79 – 4.58	0.152
Urbanity [municipal centers]	1.41	0.97 – 2.06	0.072	1.53	1.05 – 2.23	**0.028**	1.03	0.54 – 1.96	0.919
Urbanity [metropolitan areas]	1.34	0.68 – 2.63	0.400	1.40	0.71 – 2.77	0.330	1.13	0.38 – 3.37	0.832
Random Effects									
σ^2	3.29			3.29			3.29		
$\tau_{00\ \mathrm{DeSO}}$	0.15			0.19			0.00		
ICC	0.04			0.05			0.00		
N_{DeSO}	302			302			302		
Observations	1885			1885			1885		
Marginal R^2 / Conditional R^2	0.049 / 0.091			0.055 / 0.105			0.037 / 0.037		

The results from the first and second model are similar. Collective efficacy is positively associated with a neighbor or passerby both detecting the fire (OR = 2.64, $p = 0.016$) and alerting the authorities (OR = 2.56, $p = 0.020$). Standardized net income shows a borderline-significant relationship in the detection model (OR = 0.72, $p = 0.051$) and becomes statistically significant in the alert model (OR = 0.67, $p = 0.022$), indicating slightly lower odds of detection or alert as income increases. A higher percentage of residents with a university degree strongly increases the likelihood of detection (OR = 11.30, $p = 0.017$) and alert (OR = 10.44, $p = 0.023$), whereas the effect of a foreign background share remains non-significant in both models.

Regarding urbanity, only residing in municipal centers (compared to rural areas) significantly raises the odds of alerting the authorities (OR = 1.51, $p = 0.034$). The other urban categories do not differ significantly from rural areas in either model. The intraclass correlation coefficients (ICC of 0.05 for detection, 0.06 for alert) show modest variation across DeSO areas, and the marginal and conditional R^2 values suggest that these predictors explain a small but meaningful portion of the overall variance.

Moving on to the model on whether a neighbor or passersby initiated the effort to distinguish the fire, collective efficacy is significantly and negatively associated with a neighbor or passersby taking extinguishing action (OR = 0.17, $p = 0.006$). In other words, higher collective efficacy corresponds to lower odds that an onlooker initiated the effort. Second, a higher percentage of residents with a university degree strongly increases these odds (OR = 10.43, $p = 0.029$). The remaining predictors—standardized net income, percentage of foreign-background residents, and degree of urbanity—do not reach statistical significance. However, the random-effects estimates are negligible (ICC = 0.00), and the model explains a relatively small portion of the variance (marginal $R^2 = 0.038$). This is not surprising given that none of the correlations presented in Table 3 were significant. Therefore, the findings suggest that area-level characteristics have limited explanatory power in predicting whether a neighbor or passerby will attempt to extinguish a fire.

Multilevel logistic regression models – Social control and social cohesion

To be able to tease out if social cohesion or social control contributed to differing degrees in the models, we fitted the same regression models with the two subscales instead of the collective efficacy index (see Table 5). In the first two of these models, only the social cohesion subscale, and not the social control subscale, was significant. Social cohesion was positively related to a neighbor or passerby both detecting the fire (OR = 2.49, $p = 0.039$) and alerting the authorities (OR = 2.69, $p = 0.026$). The coefficients for the other variables remained essentially the same.

In the model for whether a neighbor or passersby initiated the effort to distinguish the fire, neither of the two subscales were significant.

Discussion

The aim of this study was to assess the validity and predictive power of the collective efficacy construct within the context of fire safety, offering insights into the practical utility of collective efficacy in promoting community-based disaster prevention. As such, a strength of our study is the inclusion of an objective measure of collective efficacy, namely official reports on neighbors and passersby making efforts during residential fire events, which sets it apart from many previous studies that rely primarily on self-reported perceptions (Hipp, 2016). By incorporating an objective measure, we provide a robust assessment of how collective efficacy functions in practice rather than solely relying on subjective assessments.

The result of this study contribute to the academic discussion on collective efficacy by showing that higher levels of collective efficacy at the neighborhood level increased the likelihood that a neighbor or passersby will discover the fire and alert the rescue services. Thus, there seems to be empirical support for the idea that collective efficacy not only reflects perceived social cohesion and willingness to intervene but also translates into concrete, life-saving actions in real-world emergency situations. However, while our findings indicate that collective efficacy is positively associated with neighbors and passersby detecting and reporting residential fires, these associations appear weaker in magnitude than the inverse relationships observed in previous studies linking collective efficacy to violent crime (e.g., Sampson et al., 1997; Mazerolle et al., 2010; Gerell & Kronkvist, 2017). This suggests that while social cohesion and shared expectations for action may foster active involvement in fire-related emergencies, there are likely other, more material or situational factors that shape who detects a fire and contacts emergency services.

One such factor is urbanity: people living in more densely built-up areas are simply more likely to be physically present and close enough to notice a fire as it breaks out. This is reflected in our models, where urbanity—particularly living in municipal centers—is significantly associated with a higher likelihood of neighbors or passersby alerting the rescue services. In this sense, collective efficacy may interact with the spatial and structural conditions that enable people to act in the first place. Even so, while previous studies in the residential fire literature have highlighted the role of physical proximity (Runefors, et al. 2021), our study shows that social proximity is also an important factor.

Much of the previous research on collective efficacy has focused on urban neighborhoods (Gerell and Kronkvist, 2017; Mazerolle, et al. 2010; Sampson, et al. 1997; Sampson and Wikström, 2008), particularly in large metropolitan areas where crime and social dynamics have been extensively studied. However, our study broadens this perspective by including more rural areas, offering insights into how collective efficacy functions in less densely populated settings. Apart from being structurally different from urban settings—with houses being further apart from each other—rural communities often have different social structures, with smaller, tighter-knit populations that may experience collective efficacy differently than urban neighborhoods. Sampson (1999) argues that collective efficacy and social capital should be regarded as separate concepts and that communities with weak personal and social ties can be effective units of social organization provided that trust and shared expectations for social control exist. Thus, while rural environments might score higher on social capital, expressed for instance by higher engagement in voluntary organizations among rural residents

(Lundberg, et al 2025; Paarlberg, et al. 2021), his does not necessarily imply that rural environments would exhibit higher collective efficacy.

The present study also found a negative relationship between collective efficacy and neighbors' and passersby's initiation of extinguishing efforts. However, this finding should be interpreted with caution, as the overall explanatory power of the model was low and no significant correlations were observed between collective efficacy and extinguishing behavior in the bivariate correlation matrix. This suggests that other factors—beyond collective efficacy—may better account the situations in which neighbors and passersby undertake initial firefighting actions. Still, this finding is interesting in the light of cultural norms that are particularly salient in the Swedish context. Scholars such as Berggren and Trägårdh (2022) have described a distinctive form of "state individualism" in Sweden, where personal independence is highly valued, yet closely intertwined with a strong reliance on state institutions rather than on neighbors or community networks. In this societal model, it is common for individuals to respect others' personal boundaries and refrain from intruding in situations perceived as private matters. Additionally, high levels of institutional trust (Abdelzadeh & Lundberg 2024) may reinforce a belief that emergencies are best handled by professionals, rather than by laypersons. While speculative, the observed behavior might reflect a cultural preference for fulfilling civic responsibilities—such as alerting authorities—without becoming personally entangled in the situation.

One notable finding is that social cohesion emerged as a significant factor, while social control did not, when the subscales were added separately in the regression analysis. This challenges some conventional understandings of collective efficacy, which often emphasize the role of informal social control in shaping community outcomes. For instance, when Gerell and Kronkvist (2017) added social cohesion and social control separately in their models, informal social control presented a stronger negative association with violent crime than social cohesion. The fact that social cohesion – defined as trust and shared values among residents – was the more predictive element suggests that high levels of trust within a community may be more influential in fostering a sense of collective strength than the ability to intervene in specific situations. This raises important questions about the extent to which collective efficacy, as traditionally measured, can be applied uniformly across different contexts. It is possible that social control's predictive power is more pronounced in high-crime urban settings.

There are several limitations of the present study. First, it is based on cross-sectional data survey data and fire records, which makes it difficult to draw causal conclusions. While we can identify associations between collective efficacy and specific behaviors during fire events, we cannot determine whether collective efficacy directly causes these outcomes. Future research could address this limitation by using longitudinal designs or natural experiments that allow for the tracking of changes in collective efficacy and behavior over time, particularly in response to interventions or environmental shifts. Second, although we include objective behavioral data from fire department reports, the data still rely on textual descriptions and manual coding. While careful procedures were followed to ensure consistency across coders, there might still be some degree of subjectivity or misclassification. Third, the generalizability of the findings may be limited by the context. The study is conducted in Sweden, a country with relatively high levels of institutional trust and social cohesion compared to many other settings. It is therefore unclear whether similar patterns would emerge in countries with different trust dynamics, public service infrastructure, or cultural norms surrounding intervention and neighborliness. We therefore call for studies that examine the connections between collective efficacy and citizen intervention during fire events in other national contexts.

Conclusion

This study offers novel evidence that residential fire response—specifically, whether neighbors or passersby detect residential fires and alert the rescue services—can serve as an objective behavioral indicator of collective efficacy. In areas with higher levels of perceived collective efficacy, particularly social cohesion, residents are more likely to take actions in the early stages of a fire, reinforcing the practical value of the concept beyond self-reported perceptions. While we did not find a positive relationship between collective efficacy and neighbors and passersby initiating fire suppression efforts, our findings suggest that social trust and shared expectations for action can meaningfully influence real-world emergency responses. Moreover, by including both urban and rural contexts, the study highlights how physical proximity may facilitate action in urban areas, but that social cohesion—regardless of population density—plays a central role in shaping whether individuals intervene.

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WVS, World Value Survey, Institute for Comparative Survey Research. Vienna, Austria.

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